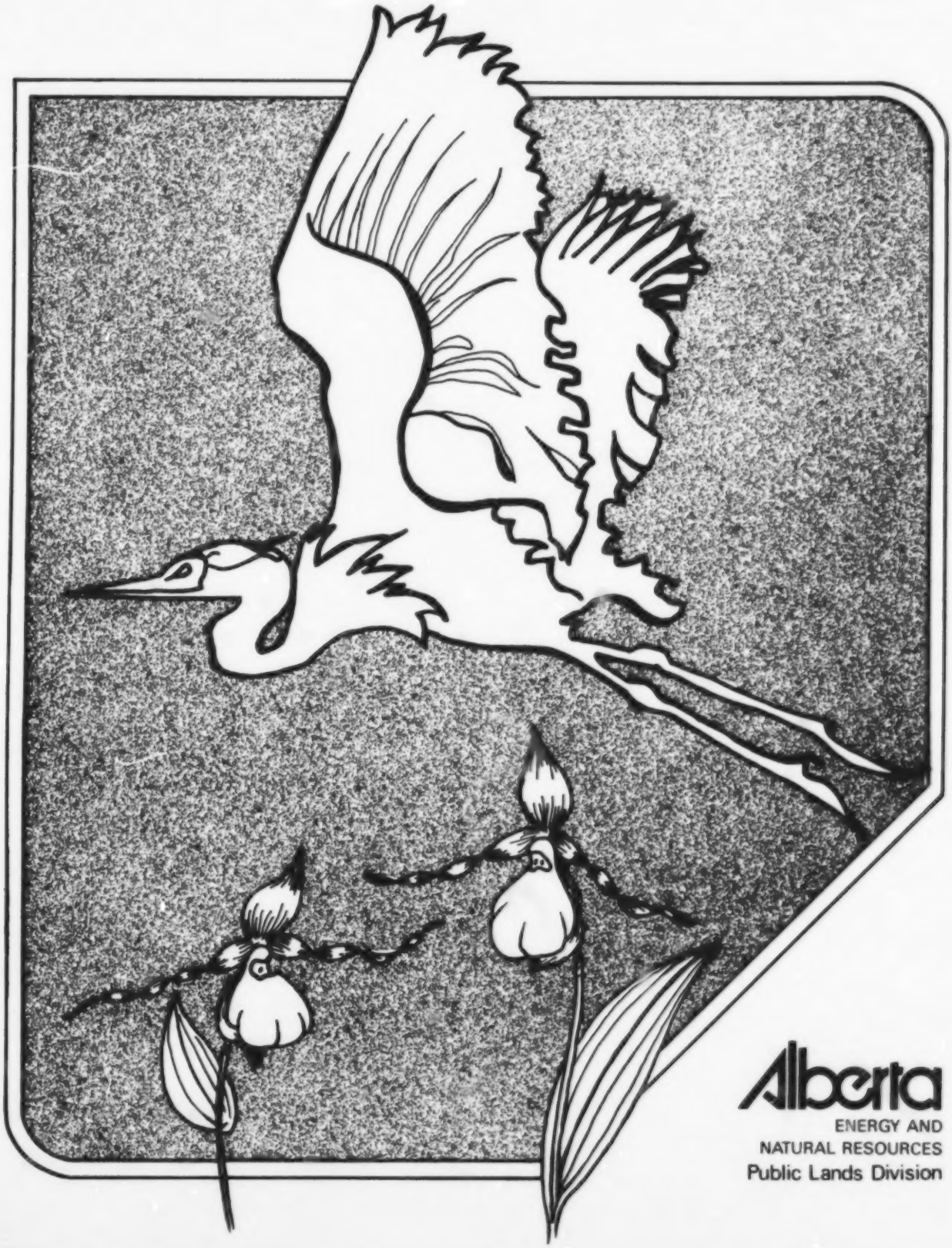
DUNVEGAN STUDY AREA
Biophysical Analysis



Alberta
ENERGY AND
NATURAL RESOURCES
Public Lands Division

PLEASE NOTE

The views and recommendations expressed in this report are those of the author and not necessarily those of the department.

DUNVEGAN STUDY AREA

Biophysical Analysis

by

John Rintoul

1979
Edmonton

This report was submitted February, 1985, to the Natural Areas Program of Alberta Energy and Natural Resources as:

Natural Areas Technical Report No. 25

INTERNAL REPORT ONLY

ACKNOWLEDGEMENTS

The assistance I received in the preparation of this report is much appreciated. Special thanks are extended to Monica Weiss and Donna Knutson for the word processing of the manuscript. Kathy Tannas and Dale Vitt identified the vascular and nonvascular plants respectively. Sandra Myers researched much of the wildlife data. Lorna Allen, Pat McIsaac, and Peter Lee provided useful comments in editing the report. Finally I would like to thank John Sisson for his companionship and assistance in the field.

TABLE OF CONTENTS

		Page
1.	INTRODUCTION	1
	1.1 Location and Size	1
	1.2 Administration and Land Use	3
2.	PHYSICAL RESOURCES	7
	2.1 Bedrock Geology	7
	2.2 Surficial Geology	7
	2.3 Soils	9
	2.4 Topography and Hydrology	9
3.	CLIMATE	12
4.	BIOLOGICAL RESOURCES	14
	4.1 Flora	14
	4.2 Vegetation	14
	4.2.1 Woodlands	14
	4.2.2 Shrublands	17
	4.2.3 Grasslands	18
	4.2.4 Wetlands	21
	4.2.5 Erosion Slopes	22
	4.3 Wildlife	22
5.	SIGNIFICANT FEATURES	24
6.	RECOMMENDATIONS	25
APPENDIX 1	Grazing History of Sec. 11-80-4-W6	26
APPENDIX 2	Annotated List of Vascular Plants for the Dunvegan Study Area	28
APPENDIX 3	Annotated List of Nonvascular Plants for the Dunvegan Study Area	34

Page

APPENDIX 4 Annotated List of Birds Observed in the Vicinity of the Dunvegan Study Area 36
APPENDIX 5 Land Status Automated System (LSAS) Reservation and Surface Disposition Detail 39
APPENDIX 6 Vegetation Stand Tables 41

LIST OF REFERENCES 54

LIST OF ILLUSTRATIONS

Figures

Figure		Page
1.	Data for Climatic Stations in Vicinity of the Dunvegan Study Area	13

Maps

Map		Page
1.	Regional Setting	2
2.	Access	4
3.	Disturbances	5
4.	Geology	8
5.	Topography and Hydrology	10
6.	Vegetation	Back Cover
7.	Significant Features	Back Cover

1. INTRODUCTION

The Dunvegan study area was originally surveyed by the International Biological Program (I.B.P.) in 1970 (Zirul 1970) to assess its potential for conservation. At that time the area was recognized as two separate sites, Erinlodge and Dunvegan. The 1970 assessment identified both sites as areas of exceptional botanical interest due to the diversity of vegetation present.

In 1981 a status report of natural areas under reservation in the Peace River Parkland Natural Region, by Public Lands Division, Department of Energy and Natural Resources (ENR), recommended that the Erinlodge site be field surveyed (Lee 1981).

The Peace River Parkland covers approximately 1.1 M ha which is less than two per cent of the province (Lee and MacIsaac 1981). As this natural section has been subjected to intensive agricultural development and settlement there are very few undistrubed native grasslands remaining. A survey of remnant grasslands in the Peace River district in 1978/1979 found only four valley grassland sites (all patented land) that were of sufficient size and relatively undisturbed for preservation (Wilkinson 1981). Wallis (Cottonwood 1983) rated the Peace River Parkland as one of three natural sections having very high priority for preservation of representative sites.

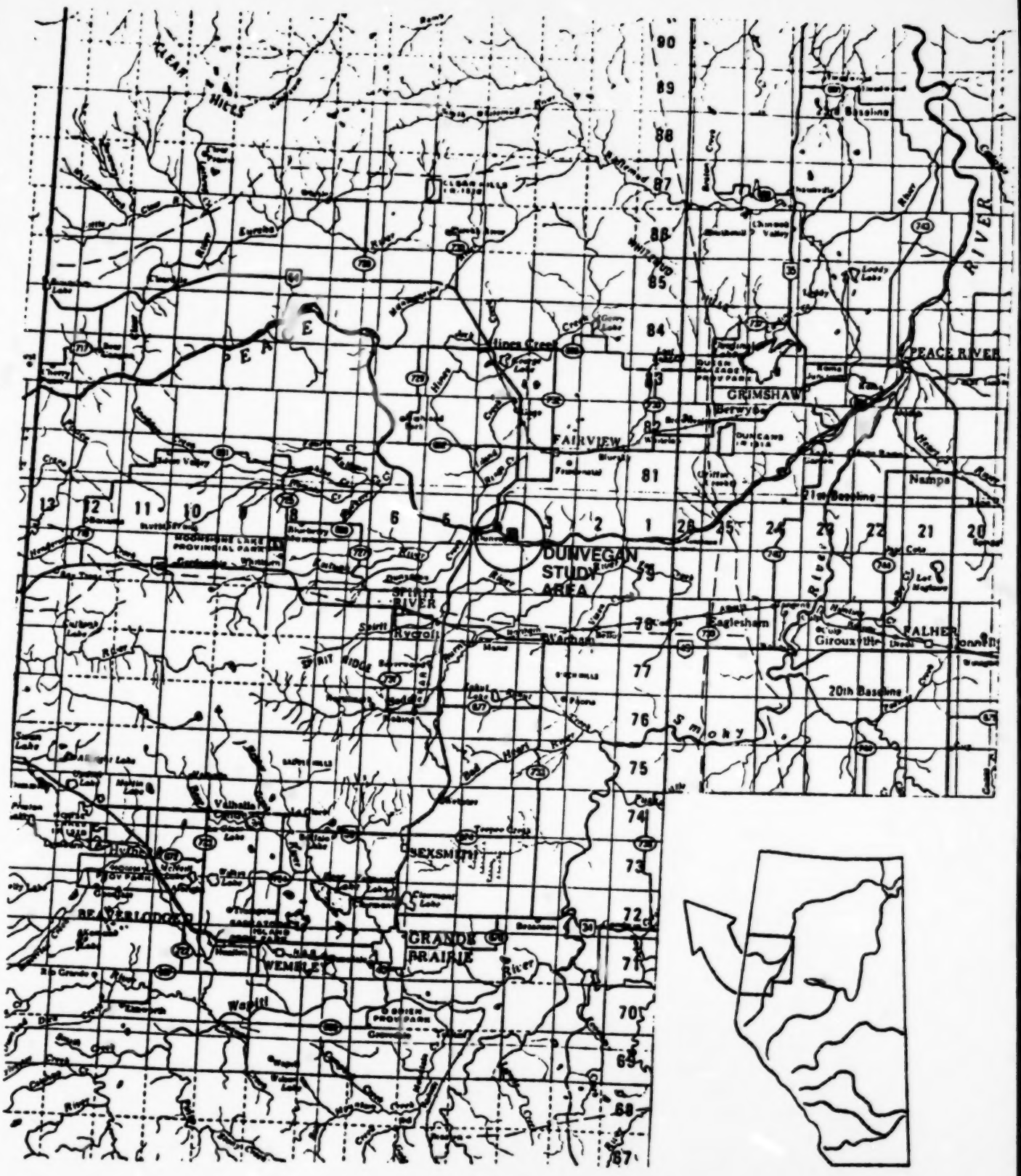
This combination of section priority and initial evaluation of the Dunvegan site emphasized the need for an intensive analysis of this site during 1984.

The objectives of the study were to:

1) Analyze the physical resources.
2) Analyze the biological resources.
3) Compile an annotated vegetation species list.
4) Compile an annotated bird species list.
5) Map vegetation communities.
6) Assess site for conservation potential.

1.1 Location and Size

The Dunvegan site is located in northwestern Alberta at 55°55'N latitude and 118°35'W longitude (Map 1). The two parcels



Map 1

Source : Provincial Base Map

DUNVEGAN

REGIONAL SETTING

of land [NW 10 (N/River), SW 15, and NE 2, 11 (both N/River) -80-4-W6] comprising the study area are situated on the north bank of the Peace River approximately three and five kilometres downstream from Dunvegan (Highway 2 bridge over Peace River). The nearest towns are Fairview, 17 km to the northeast and Spirit River, 25 km to the southwest. The site can be reached by driving approximately 14.25 km north and east, from the Dunvegan bridge, on Highway 2, then 3 km south, across Boucher Creek, a 10 m jog east, then 6 km south along gravel side roads, and finally 1.5 km west on a farmer's trail to the northeast corner of Section 11-80-4-W6. The west parcel of the site (NW 10, SW 15-80-4-W6) can be reached by hiking along the tableland or accessing the river and hiking along the shore of the Peace River (Map 2).

Alternatively the site can be accessed by driving through the provincial campground at the north end of the Dunvegan bridge and along a private, dead-end access road to a point just west of Boucher Creek. From that point it is an easy hike down the bank to the southwest corner of the site (NW 10-80-4-W6) (Map 2).

Access by water is also possible. The put-in point is adjacent to the downriver side of the Dunvegan bridge (north bank). It is an easy, short paddle/float down to the two parcels of land (3-5 km).

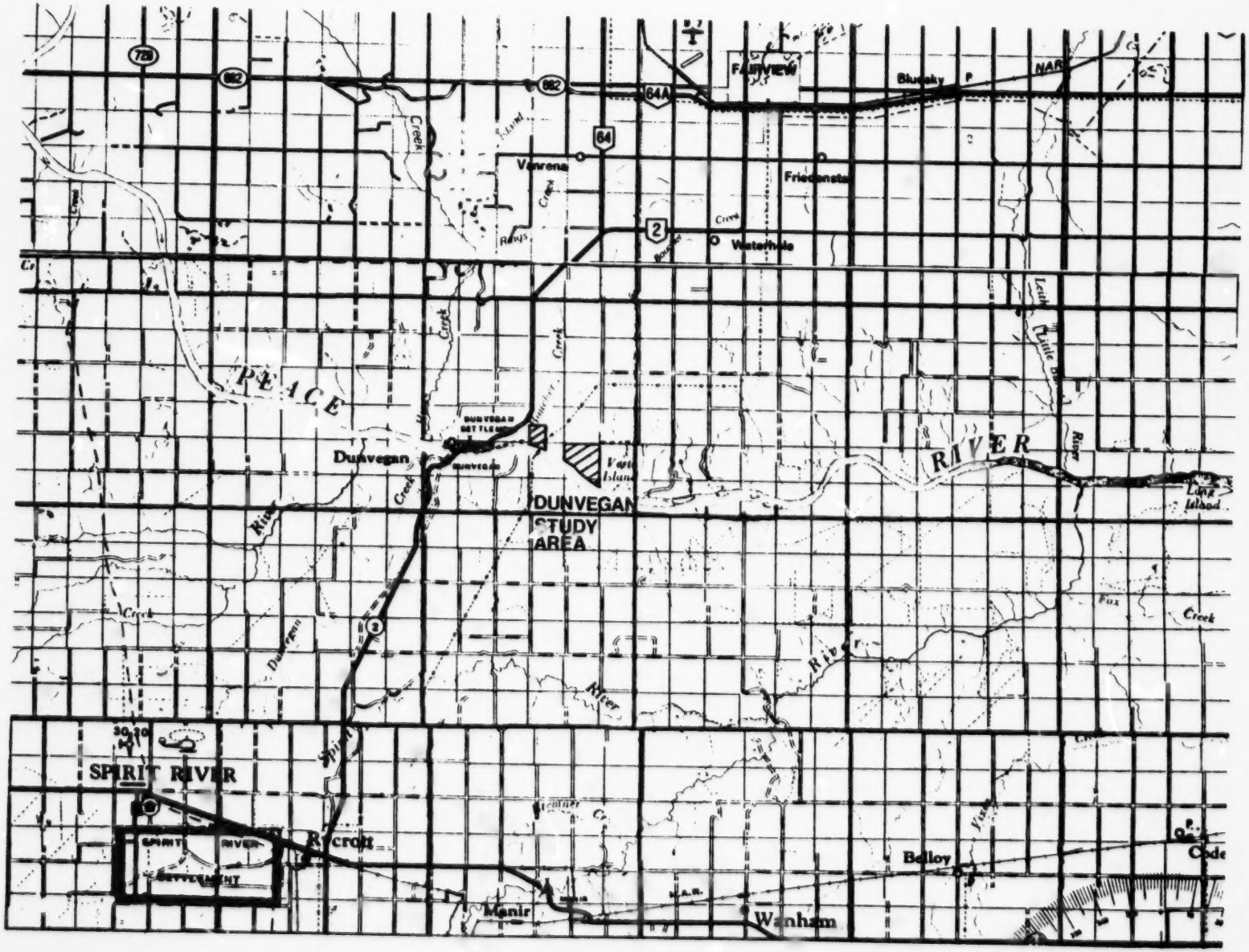
The west parcel [NW 10 (N/River), SW 15-80-4-W6] consists of 81 ha. The larger parcel [SE 2, 11 (both N/River) -80-4-W6] is 226 ha. The combined area totals 307 ha.

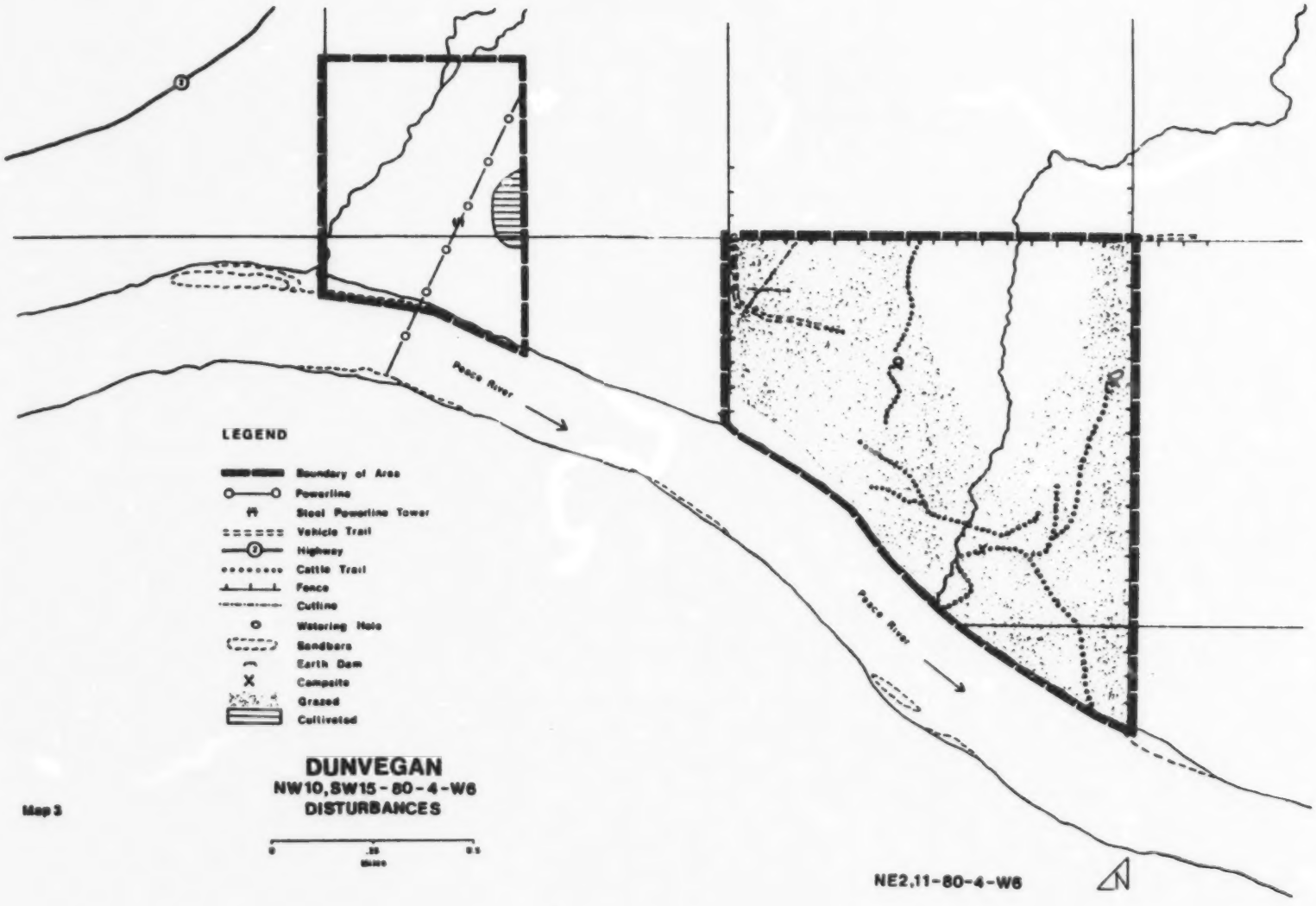
1.2 Administration and Land Use

The study area is crown land within the White Zone of the province (1:1 500 000 Public Lands Division classifications map), and is administered by the Public Lands Division of Energy and Natural Resources (ENR).

Public Lands Division land files indicate that Section 11 (N/River) -80-4-W6 has been grazed at varying intensities since the early 1930s (originally under a School Lands grazing permit). Records indicate a pre 1950s grazing rate of 31-75 head of cattle (and some horses) per season (Appendix 1). A land standing report dated March 2, 1970 identifies NW 10 (N/River) -80-4-W6 as belonging to the same lease (Ranch 31506) as Section 11 (N/River) -80-4-W6, however there is no earlier indication of grazing on this parcel. A land standing dated 19.11.80 identifies NE 2 (N/River) -80-4-W6 also as part of Ranch 31506. All portions of the study area are presently under a grazing lease (GRL 31506) (Map 3).

Under a range improvement project in the 1960s, two small earth fill dams were constructed across the upper reaches of drainage draws in Section 11-80-4-W6 to impound water for cattle (Map 3).


PEACE
RIVER
DUNVEGAN
STUDY
AREA
Dunvegan
SPIRIT RIVER
Rycroft
Manir
Wanham
Belloy
Waterhole
Vanrena
FAIRVIEW
Bluesky
NAR
Code
Fox
Creek
Dunvegan
Creek
Spirit
River
Creek
Creek
Creek


Peace River
Peace River
LEGEND
Boundary of Area
Powerline
Steel Powerline Tower
Vehicle Trail
Highway
Cattle Trail
Fence
Cutline
Watering Hole
Sandbars
Earth Dam
Campsite
Grazed
Cultivated
DUNVEGAN
NW10, SW15 - 80 - 4 - W6
DISTURBANCES
0
.25
.5
Miles
NE2,11-80-4-W6

Map 3

The agricultural capability is rated at Class 3, with moderate limitations due to topography (ENR Agricultural Capability Map). The slopes are not rated. A land appraisal report in 1959 (Public Lands Division) rated Section 11 (N/River) -80-4-W6 as rough non-agricultural land. No record of appraisal is available for the other portions. A small portion of tableland in NW 10 and SW 15-80-4-W6 is at present under cultivation.

Canada Land Inventory (CLI) capability for forestry is rated at Class 3-6, with moderate to severe limitations (soil moisture), for the growth of commercial forests (Canada Land Inventory Map 84M). The best (CLI Class 3) land occurs on the alluvial terrace.

Capability for waterfowl production is very low (CLI Class 6), having severe limitations due to adverse topography and fast flowing water.

There is moderate (CLI Class 4) to moderately low (CLI Class 5), capability for outdoor recreation. Attractions include interesting rock formations (outcrops), topographical variety and suitable camping spots. Existing recreational use is probably low due to proximity to the campground and river access poirt at the Dunvegan bridge (three to five kilometres upstream). An occasional hunter may utilize the area for mule deer/black bear hunting.

During the summer of 1984, a university graduate student was conducting a study on the sandstone outcrops along the slopes of the study area. Other scientific use (especially geological) may have occurred as the bedrock outcrops are easily accessible from Highway 2.

A powerline and supporting steel tower authorized under a Licence of Occupation (LOC) and Ezement (EZE) dispositions (Appendix 5) are situated in NW 10 and SW 15-80-4-W6.

2. PHYSICAL RESOURCES

2.1 Bedrock Geology

The study area is underlain by the Cretaceous Dunvegan Formation. This formation is composed of alternating beds of sandstones and shales (up to 24 m thick). The sandstones are cross bedded, feldspathic, massive, light grey to buff, and fine grained. Within the sandstones are hard calcareous beds, laminated siltstone and grey silty shale. The Dunvegan sandstones represent the outer margins of a delta built up as a broad apron that skirted an upland centered on the Cassiar and southern MacKenzie Mountains in B.C. This continental sandstone from the west is interfingered with marine sandstones from the east (Mollard 1975). The bedrock elevation is at approximately 425-455 m above sea level (Jones 1966).

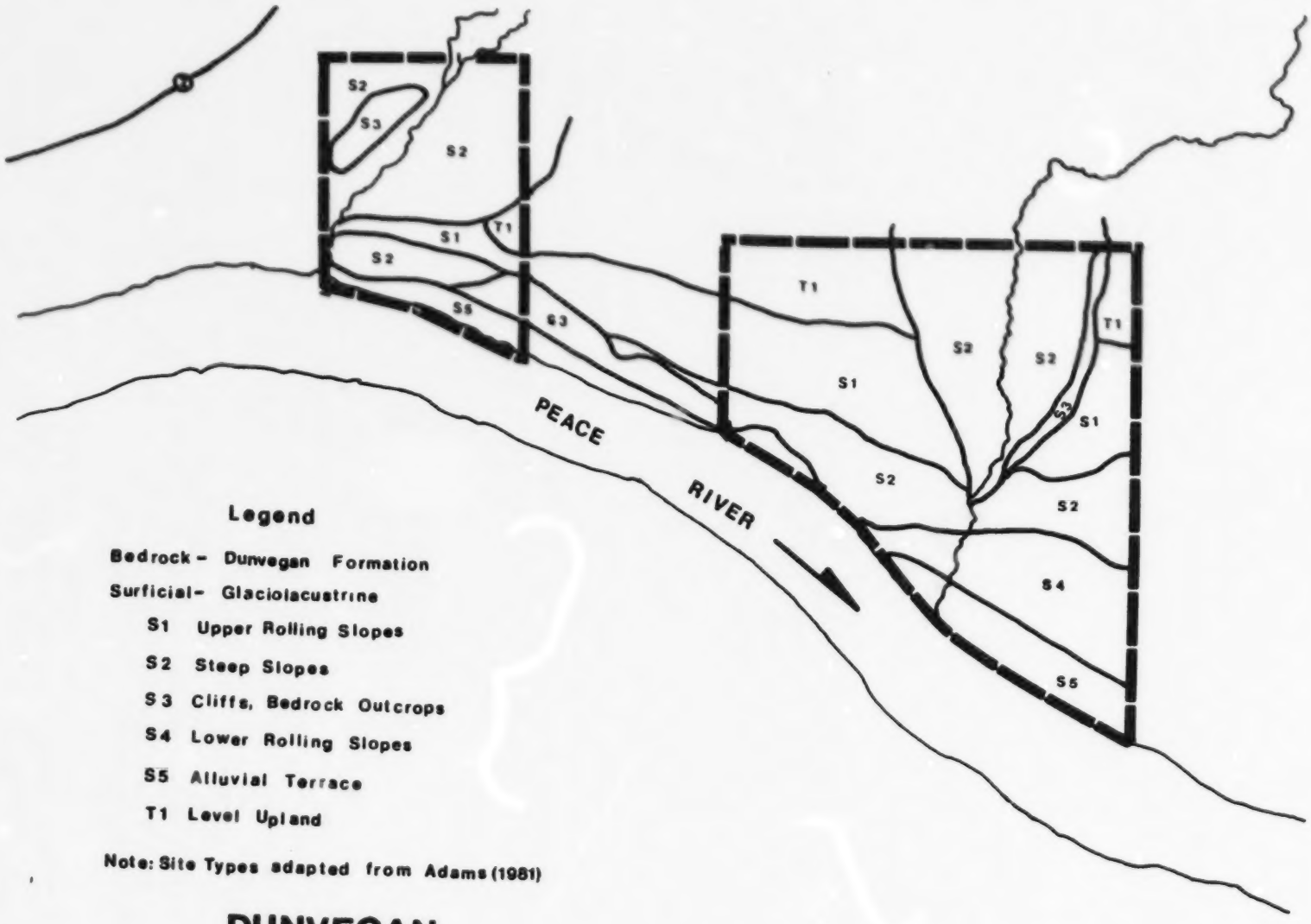
The Dunvegan Formation weathers to castellated forms (Camsell and Malcolm 1921). At the study area, outcrops of the Dunvegan sandstones occur on the valley slopes of the Peace River.

A pre-glacial valley (Shaftesbury), is situated to the west of the mouth of Boucher Creek. This 10-15 m deep sand and gravel deposit is aligned in a northwest to southeast direction. (Lorberg and de la Cruz 1981; Monenco 1976.)

2.2 Surficial Geology

The Quaternary glacial drift overburden consists of clayey till overlain by glaciolacustrine deposits from Glacial Lake Peace (Monenco 1976). This lake was ice dammed, drained eastwards and was confined to the Peace River valley. It eventually merged with Glacial Lake Tyrrell (Taylor 1960). During post-glacial times the Peace River and tributary creeks deeply incised the glaciolacustrine sediments.

Recent deposits consist of alluvium on river terraces, and colluvium on the steeper slopes (Map 4).



Legend

Bedrock – Dunvegan Formation

Surficial – Glaciolacustrine

S1 Upper Rolling Slopes

S2 Steep Slopes

S3 Cliffs, Bedrock Outcrops

S4 Lower Rolling Slopes

S5 Alluvial Terrace

T1 Level Upland

Note: Site Types adapted from Adams (1981)

DUNVEGAN

Geology

Map 4

0 .25 .5

N

2.3 Soils

The majority of the study area's soils are derived from glaciolacustrine and morainal parent material. These soils have weakly developed horizons and are limited to solonetzic black chernozems, orthic eutric brunisols and orthic regosols of clay loam to silty loam texture with possibly solonetzic grey luvisols under wooded areas (Adams 1981).

River level terraces also have immature, weakly developed soils (orthic and cumulic regosols) of sandy to silty loam texture (Odynsky and Newton 1950; Adams 1981). The deposit is shallow, rarely exceeding 0.6 m (Odnysky and Newton 1950). Chernozems are of the Tangent and Judah Series. Both series are of silty loam to silty clay loam texture and susceptible to water and wind erosion. Tangent soils are of alluvial origin while Judah are lacustrine derived (Odynsky and Newton 1950).

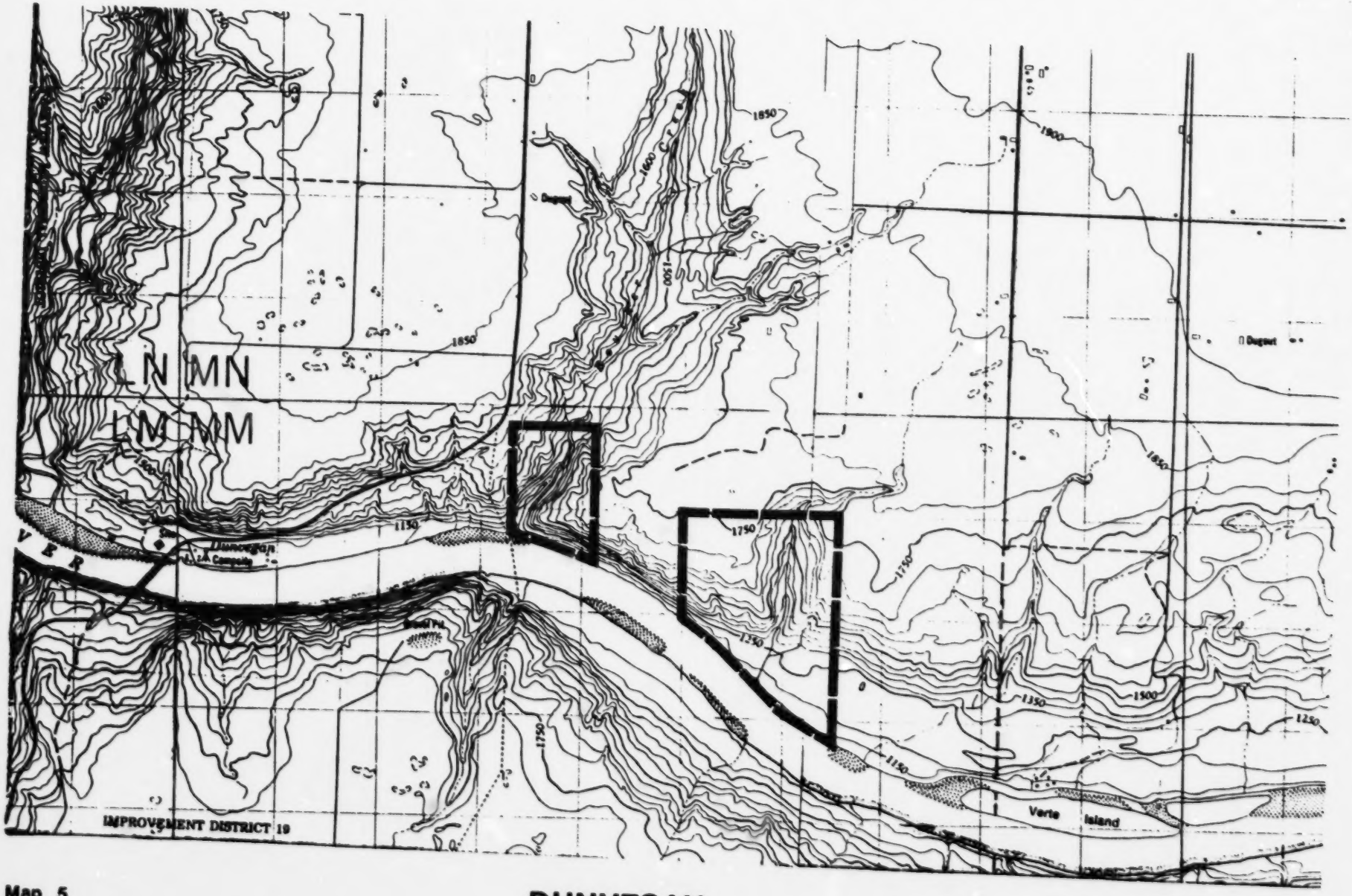
A solodized solonetzic soil (Fahler Series), occurs in association with the Judah Series on SW 15-80-4-W6. Fahler soils occur on lacustrine parent material. They are grey to dark grey silty loam to clay loam, stone free and imperfectly to poorly drained. This soil series is also susceptible to wind and water erosion. Adam's (1981) analysis of Peace River slopes (upriver from Dunvegan) suggest that the level upland possesses clay loam, dark grey solodic soil on glaciolacustrine material.

Zirul's (1970) I.B.P. survey of the site identified dark brown grey chernozems and brown to dark brown to black soils (brunisol equivalent?) with alluvial silt/sand on the alluvial terrace. No soil survey was conducted during the present study.

2.4 Topography and Hydrology

The study area predominantly comprises the steep slopes of the Peace River valley (north bank), and portions of two tributary creek valleys (Map 5). Elevation ranges from 336 m at the Peace River to 533 m asl on the tableland (197 m elevation difference). The slopes vary from moderate to very steep, and include bedrock cliffs. The tableland is gently rolling and may gradually or abruptly change to the steep slopes. The Peace River valley is approximately 1.5-3.0 km wide at the top, and 0.5 km wide at the bottom, at the study area (valley is narrower at the west site) (Map 5).

The west site [(NW 10 (N/River), SE 15-80-4-W6] is diagonally bissected by deeply incised Boucher Creek (1.2 km within study area). Boucher Creek has a total length of 20 km. The east site [NE 2, 11 (both N/River) -80-4-W6] is deeply incised by a short (4.5 km) creek



Map 5

DUNVEGAN

TOPOGRAPHY & HYDROLOGY

CONTOUR INTERVAL 50 ft

Scale 1:50 000

Source: 83M15, 83M16

(1.5 km within study area). There are long, relatively deep seated slope failures along both creeks (Mollard 1975).

A small alluvial fan occurs at the mouth of Boucher Creek. A lower and higher terrace (Mollard 1975), occurs in SE 11 and NE 2 (both N/River) -80-4-W6.

There are no identified springs on the study area. Groundwater recharge is similar to that found in the Edmonton area. The bedrock has low permeability and contains moderate to highly brackish (high total dissolved solids) groundwater (Jones 1966).

3. CLIMATE

The regional climate is described as moderate continental with short moderately warm summers and long, relatively cold winters. It is similar to that of central Alberta but the summers are slightly shorter and cooler and the winters are somewhat longer and colder (Cottonwood 1983). The May and August mean daily maximum temperatures are higher than the surrounding boreal forest, being similar to those found south of the Athabasca River. The mean date of first autumn (September 1st) and last spring frosts (June 1st), are later and earlier, respectively, than the boreal forest, resulting in a longer mean frost-free period [100 days (Masterton, Crowe and Baker 1976)].

The closest climatological station with long term records is at Fairview, 17 km to the northeast and at approximately 150 m higher elevation than the study area. July is the warmest month (mean daily temperature of 16°C) and an extreme maximum temperature of 36.1°C. The coldest month is January (mean daily temperature of -17.8°C) and the extreme minimum temperature (-45°C) occurs in December (Environment Canada 1982). The average frost-free period is 119 days (range 77-154) with the mean last and first frosts occurring on May 19th and September 16th (Environment Canada 1976). Chinooks are not common (5-10 days per year).

The majority of the rainfall occurs during the summer [June - August; highest (77.7 mm) in July]. Snowfall is greatest (25.6-33.2 rainfall equivalent mm) from November to February. Total mean annual precipitation is 446.6 mm (Environment Canada 1982).

Winds are usually light, with a mean monthly wind speed between 10.1 and 13.3 km per hour, and generally from the northwest and west except for February - April when easterly winds occur (Environment Canada 1982).

Mean annual sunshine amounts to 2 059.9 hours with July having the greatest amount (280.1 hours) (Environment Canada 1982).

Table 1 summarizes the climatological data for Fairview. Data from two stations to the south and southwest, Wanham and Spirit River are also included to give an indication of possible differences between data from Fairview and the climate that exists at the study area (approximately triangulated by the three climatological stations).

Table 1

DATA FOR CLIMATIC STATIONS IN VICINITY OF THE DUNVEGAN STUDY AREA

Fairview 56°04'N 118°23'W 670m

	J	F	M	A	M	J	J	A	S	O	N	D	YEAR
Daily Max. Temp.	-13.8	-7.2	-2.2	8.0	16.1	19.8	21.8	20.6	15.2	8.8	-2.3	-9.1	6.3
Daily Min. Temp.	-21.8	-15.9	-11.5	-2.4	4.0	8.0	10.1	8.9	4.4	-0.6	-9.8	-17.0	-3.6
Daily Temp.	-17.8	-11.6	-6.9	2.8	10.1	14.0	16.0	14.8	9.8	4.1	-6.1	-13.1	1.3
Extreme Max. Temp.	10.0	12.2	15.6	29.4	32.2	33.3	36.1	34.4	31.1	26.1	18.3	9.4	36.1
Extreme Min. Temp.	-44.4	-43.9	-36.1	-31.7	-10.6	-1.7	1.1	-3.9	-11.1	-21.7	-34.4	-45.0	-45.0
Rainfall	0.9	0.4	1.2	7.0	37.0	67.5	77.7	52.0	32.1	14.2	3.6	0.8	294.4
Snowfall	33.2	27.7	25.6	13.1	2.1	0.1	0.0	0.4	3.1	11.7	25.6	32.4	175.0
Total Precipitation	28.8	24.8	23.6	18.5	39.1	67.6	77.7	52.4	34.5	25.4	25.2	29.0	446.6

Wanham 55°44'N 118°24'W 607m

Daily Max. Temp.	-13.1	-6.7	-1.5	8.7	16.6	20.4	22.0	21.1	15.7	10.1	-1.3	-8.3	7.0
Daily Min. Temp.	-23.3	-17.4	-12.7	-2.8	3.6	7.8	9.7	8.2	3.6	-0.9	-10.7	-18.6	-4.5
Daily Temp.	-18.2	-12.1	-7.1	3.0	10.1	14.2	15.9	14.7	9.7	4.7	-6.0	-13.5	1.3
Extreme Max. Temp.	11.7	12.8	17.2	29.4	31.1	33.9	32.8	32.2	29.4	26.7	18.0	10.0	33.9
Extreme Min. Temp.	-48.3	-40.0	-36.7	-22.8	-7.2	-3.9	0.0	-2.2	-10.6	-23.3	-41.1	-43.3	-48.3
Rainfall	0.4	0.4	0.7	8.5	37.1	70.7	67.0	55.7	40.6	15.3	4.2	0.7	301.3
Snowfall	28.2	25.1	23.2	14.9	2.2	0.0	0.0	0.4	2.4	11.3	25.1	26.8	159.6
Total Precipitation	28.6	25.4	23.9	23.7	39.3	70.7	67.0	55.6	43.0	26.8	29.3	27.5	460.8

Spirit River 55°47'N 118°50'W 630m

	J	F	M	A	M	J	J	A	S	O	N	D	YEAR
Daily Max. Temp.	-12.0	-5.3	-0.6	9.4	17.4	20.8	22.8	21.5	16.1	10.2	-0.3	-7.2	7.7
Daily Min. Temp.	-21.8	-15.6	-10.7	-1.8	4.9	8.8	10.8	9.7	5.1	0.4	-9.3	-16.7	-3.0
Daly Temp.	-17.0	-10.4	-5.7	3.8	11.2	14.8	16.8	15.6	10.6	5.4	-4.8	-12.0	2.4
Extreme Max. Temp.	11.1	13.3	12.2	26.0	30.6	32.2	31.0	33.9	31.1	27.0	18.0	11.0	33.9
Extreme Min. Temp.	-40.0	-37.0	-32.2	-19.4	-6.1	0.6	3.9	0.0	-9.4	-23.3	-31.1	-40.0	-40.0
Rainfall	0.2	10.9	1.0	6.4	36.1	68.3	64.7	51.5	34.9	18.8	3.1	0.3	296.2
Snowfall	27.9	23.7	23.0	12.8	3.1	0.0	0.0	0.6	3.0	8.9	24.9	31.2	159.1
Total Precipitation	30.2	29.2	24.3	20.8	39.7	68.3	64.7	52.2	37.9	28.5	27.8	33.0	456.6

SOURCE: Environment Canada (1982)

NOTE: Temperature in °C; Rainfall and Total Precipitation in mm; Snowfall in cm. Single letters at the top of the table refer to the months of the year (January to December).

4. BIOLOGICAL RESOURCES

4.1 Flora

A total of 153 vascular species, comprising 102 genera and 43 families have been identified as occurring at the Dunvegan study site. Species-rich genera include Equisetum, Stipa, Artemisia and Aster with five species each. Graminiae and Compositae are the richest families in terms of diversity, with 25 species each. Other species-rich families include Rosaceae (11), Leguminosae (10), Ranunculaceae (7) and Equisitaceae, Cyperaceae, Liliaceae, Cruciferae, and Caprifoliaceae with five species each.

Two species (Stipa comata and Chenopodium leptophyllum) are notable for an extension to their reported collected areas (Packer and Bradley 1984). A further seven species (see Appendix 2) have only a few reported collections from the study area region (Packer and Bradley 1984). Twelve species are introduced plants (Packer and Bradley 1984). Six of the collected species have been mounted by K. Tannas and are in the Natural Areas Herbarium (see Appendix 2).

Only seven mosses (of six families) and seven lichens (of four families) have been identified as occurring on the study area. Cladonia was the only genera with more than one species represented.

4.2 Vegetation

4.2.1 Woodlands

Approximately 50 per cent of the study area is comprised of woodlands. There are three distinct types, the most abundant by far being aspen (Populus tremuloides) woodlands.

While aspen woodlands also occur on level to gently rolling upland, in the deeper drainage draws on steep south facing slopes, and on the alluvial terraces, the main extent occurs on east and west facing valley slopes of the tributary creek valleys. Soils range from regosols to brunisols and possibly luvisols (Adams 1981, Zirul 1970). Zirul (1970) identified seven different aspen community types (four with rose (Rosa), and one each with dogwood (Cornus), saskatoon

(Amelanchier) and willow (Salix) as associates. This survey recognized only major groupings of Aspen-Dogwood-Wild Sarsaparilla-Hairy Wild Rye, Aspen-Saskatoon-Wild Sarsaparilla-Hairy Wild Rye, Aspen-Rose-Brome Grass and Aspen-Bearberry (Arctostaphylus). Zirul's Aspen-Willow community was not found.

Aspen-Dogwood-Wild Sarsaparilla-Hairy Wild Rye. This maturing seral community type occurs on mesic moderately well drained alluvial sites adjacent to Boucher Creek. Elevation is approximately 380 m.

Populus tremuloides is dominant in the canopy, sub-canopy and tall shrub layers. Betula papyrifera is an associate in the canopy and is also present, along with Picea glauca, in the sub-canopy. Tall shrubs are well represented by Cornus stolonifera and Salix bebbiana in addition to Populus tremuloides. Low shrubs include Cornus stolonifera, Rosa woodsii and Vibernum edule. A well developed dwarf shrub-herb layer is dominated by Aralia nudicaulis with Elymus innovatus prevalent. Other species include Vicia americana, Fragaria virginiana, Galium boreale, Bromus ciliatus and Agropyron trachycaulum.

The Populus tremuloides and Betula papyrifera are rather small (9 m high, 16.7 and 18 cm dbh respectively).

Aspen-Saskatoon-Wild Sarsaparilla-Hairy Wild Rye. On less mesic sites occuring on the mid portions of strong (20^{0}) slopes at approximately 395 m asl this Populus tremuloides young seral community is present. Soils are mesic, moderately well drained.

Populus tremuloides is the only species present in the canopy. There is no sub-canopy. Tall shrubs are limited to Prunus virginiana and Amelanchier alnifolia. These two species are also present in the low shrub layer in association with Cornus stolonifera and Rosa woodsii. Dwarf shrubs - herbs are dominated by grass sp., Aralia nudicaulis, Actaea rubra, and Symphoricarpos alba. Other species include Apocynum cannabinum, Vicia americana and Galium boreale.

Aspen-Rose-Brome Grass. This community type is found on mesic, moderately well-drained regosolic soils on the higher terrace west of the unnamed creek.

Species composition above the dwarf shrub-herb is similar to the preceeding community type except for the absence of Prunus virginiana and Cornus stolonifera in the shrub layers. Rosa spp. are more abundant in this type in the low shrub layer than in the preceeding type. The dwarf shrub-herb layer is dominated by Rosa woodsii and Bromus ciliatus. Other species in this layer include Symphoricarpos alba, Thalictrum venulosum, Galium boreale, Fragaria virginiana, Achillea millefolium and Maianthemum canadense.

The Populus tremuloides is 12.2 m high with a dbh of 16.9 cm.

Aspen-Bearberry. This maturing seral community type occurs on submesic, well-drained, very gentle south facing slopes (5°) on the sloping alluvium in the southeast corner of the east portion of the study area at 365 m asl.

Populus tremuloides is the only species in both the sub-canopy and tall shrub layer but is overtopped by scattered Picea glauca in the canopy. Low shrubs are dominated by Amelanchier alnifolia. Associates include Rosa acicularis and Populus tremuloides. Arctostaphylos uva-ursi is the only abundant herb. Other herb species include Fragaria virginiana, Lathyrus sp., Aster spp., Vicia americana and Galium boreale.

Picea glauca attains a height of 9.2 m (24 cm dbh). The Populus tremuloides is small (6.7 m high, 14 cm dbh).

Balsam Poplar-Dogwood-Herb. A small balsam poplar woodland occurs on the narrow alluvial terrace on top of the active bank of the Peace River. Soils are limited to regosols. Zirul (1970) identified this community as a Balsam Poplar-Willow community.

White spruce (Picea glauca) woodlands are restricted to small areas on the alluvial terrace and in association with balsam poplar (Populus balsamifera) on the lower slopes of the tributary creek valleys. Soils are mainly regosols (Adams 1981, Zirul 1970). Three white spruce communities were identified in this study: White Spruce-Twinflower (Linnaea borealis), White Spruce-Shrub-Herb, and White Spruce-Balsam Poplar-Dogwood-Buffaloberry (Shepherdia canadense)-Wild Sarsaparilla (Aralia nudicalis). It should be noted that Zirul's (1970) I.B.P. survey identified only black spruce (Picea mariana) communties.

White Spruce-Twinflower. This community type occurs on the higher alluvial terrace, adjacent to the east side of the unnamed creek in 11-80-4-W6. Inferrred soils are submesic, moderately well-drained regosols on nearly level (2°) slopes at 365 m above sea level (asl).

This is a species poor community consisting of Picea glauca in the canopy and sub-canopy and scattered Linnaea borealis and bryoids in the herb and bryoid layers. Humus covers 90 per cent of the ground surface.

The Picea glauca is small, the highest trees being 9.8 m with a diameter (dbh) of 16.1 cm.

White Spruce-Shrub-Herb. This community type occurrs on slightly more mesic positions on the higher terrace, slightly downslope (350 m asl) from the previous community.

Picea glauca is dominant in the tree canopy and sub-canopy. Populus tremuloides is also present at low cover values in the

sub-canopy. Tall shrubs are limited to scattered Salix planifolia. Low shrubs are not abundant, being restricted to Rosa acicularis and Shepherdia canadensis. The dwarf shrub-herb layer is somewhat richer and is dominated by Rosa acicularis and Linnaea borealis. Other species include Maianthemum canadense, Rubus arcticus, Galium boreale and Aralia nudicaulis.

The Picea glauca is 10.7 m in height with a dbh of 15.5 cm. Coring revealed an age of 40 years.

White Spruce-Balsam Poplar-Dogwood-Buffaloberry-Wild Sarsaparilla. On the lower colluvial east and west facing slopes (28°) with submesic well drained soils a mixedwood community type is present. Elevation is 460 m.

Picea glauca cover forms the canopy. Populus balsamifera dominates the sub-canopy with Picea glauca an associate in this layer. Tall shrubs are depauperate, limited to Salix sp. Low shrubs have greater diversity and abundance, being dominated by Cornus stolonifera, Shepherdia canadensis and Rosa woodsii. Re-generating Picea glauca is also present in this layer. The dwarf shrub-herb layer is primarily composed of Aralia nudicaulis and Equisetum arvense with Shepherdia canadensis and Fragaria virginiana as associates. Other species include Rubus idaeus, Ribes oxycanthoides, Pyrola assarifolia and Galium boreale.

The Picea glauca attains a height of 21.3 m with a dbh of 27.2 cm. The Populus balsamifera is 10.7 m high (17.4 cm dbh).

4.2.2 Shrublands

Compared to woodlands and grasslands, shrubland communities are relatively limited in the study area, covering approximately 10 per cent of total area. They are restricted to the steep slope shallow drainage draws and occur as a narrow transition zone between aspen woodlands and grasslands on the gently rolling tableland and on the alluvial terrace. Soils are intermediate between those found in grasslands and woodlands.

The predominant shrub is saskatoon (Amelanchier alnifolia). Three communities were identified during this survey: Saskatoon-Rose, Saskatoon-Rose-Buckbrush (Symphoricarpos occidentalis), and a more xeric Saskatoon-Bearberry. Zirul (1970) noted five communities, the most significantly different being a Saskatoon-Blueberry (Vaccinium sp.)-Fescue (Festuca) type. These were not found during the present study.

Saskatoon-Rose. This shrub community is found on the lower and less steep portions of slump scars along the tributary creek valleys than the Needle Grass-Wheat Grass community. The inferred soils are

submesic, moderately well-drained brunisols and regosols on 20° west facing slopes.

Amelanchier alnifolia and Rosa acicularis are co-dominants in the low shrub layer. Prunus virginiana is present at a lower cover value. Vicia americana is the dominant species of the dwarf shrub-herb layer. Associates include Agropyron trachycaulum, Bromus anomalous, Symphoricarpos occidentalis, Achillea millefolium and Fragaria virginiana.

Saskatoon-Rose-Buckbrush. This type is very similar compositionally to the preceeding community. Soil conditions are similar but this type is found on the moderate (10°), southwest facing upper slopes.

The major difference between this type and the Saskatoon-Rose community is the predominance of Symphoricarpos occidentalis in the dwarf shrub-herb layer. This species also replaces Prunus virginiana in the low shrub layer. Additional species found in this community include Stipa curtiseta, Koeleria macrantha, and Agrostis scabra.

Saskatoon-Bearberry. This shrub-herb community occurs as openings in the Populus tremuloides-Arctostaphylos community. Inferred soils are submesic, well-drained regosols on moderate (10°), southwest facing alluvial slopes.

Arctostaphylos uva-ursi is the predominant dwarf shrub-herb layer component. Amelanchier alnifolia and Rosa woodsii individuals may reach into the low shrub layer. Amelanchier alnifolia, Galium boreale, and Agropyron trachycaulum are abundant species in the dwarf shrub-herb layer. Other species include Stipa curtiseta, Campanula rotundifolia and Monarda fistulosa.

4.2.3 Grasslands

Wilkinson (1981) classified the slope grasslands of the Peace River area as a Stipa-Carex-Artemesia (ST-CA-AR) (needle grass-sedge-sage) community. This is analagous to Moss's (1952) Agropyron (wheatgrass)-Stipa-Carex (AG-ST-CA) association. Moss describes three faciations of this association, the climax being AG-ST. As the steep slope ST faciation undergoes levelling and the AG-CA faciation is built up, the community approaches the climax vegetation.

Most of the slope grassland on the study area occurs on rolling slopes. Whereas these rolling slopes are confined to upper positions on the narrow canyons upriver from Dunvegan, they reach all the way to the valley bottom downriver from this point (Adams 1981). The soils include solonetzic black chernozems, orthic eutric brunisols, and orthic regosols (Adams 1981). Zirul's (1970) survey indicated the presence of chernozems and brunisols. The texture is clay loam to

silty loam on lacustrine/morainal parent material with poor subsoil permeability (Adams 1981).

This study identified six different Stipa communities, a Stipa-Agropyron and an Agropyron community and one Poa (bluegrass) community. Zirul's (1970) grassland communities seem to suggest (as names listed without species composition) the dominance of Agropyron and Koeleria (junegrass). He also identified a Festuca-Koeleria-Aster community that was not found during the present study. The most plausible explanation for this discrepancy is the grazing pressure preceeding each survey. Zirul (1970) noted that the area had been heavily grazed in the past but appeared to be decreasing. Lee (Public Lands Division, ENR, Jan. 1985, personal interview) found the site in good condition (light grazing). Grazing during the 1984 season appeared to be locally moderate to heavy. Adams (1981) suggests that on this range site type under heavy grazing pressure Stipa spartea will decrease in cover value with a concomitant increase in the values for Carex, Koeleria and Agropyron. Unfortunately, stocking rates are not available for several of the past years, thus it can only be surmised that the I.B.P. survey (Zirul 1970) occurred post heavy grazing while the present survey was preceeded by a lighter grazing regime.

Climate and weather also can drastically offset species composition/abundance in native grasslands (Wallis 1982). Climatic/weather data was not analysed to determine the applicability of this factor to the difference noted between the two surveys.

Green Needle Grass-Sage. This community type occurs on xeric, rapidly drained, southwest facing, strong (26°) slopes (mid-lower positions). Inferred soils are chernozems/regosols.

Stipa viridula is by far the predominant species. Artemisia is much less abundant. Other graminoids include Agropyron dasystachyum, Koeleria macrantha, and Poa sp. Herbs include Allium cernuum, Linum lewisii, Melilotus alba, Astragalus striatus and Campanula rotundifolia.

Spear Grass. This grassland community type is present on the upper xeric, rapidly drained extreme (40°) southwest facing slopes at 460 m elevation.

Stipa comata is the only abundant species. Other graminoids include Poa sp., Agropyron dasystachyum, and Koeleria macrantha. Herbs include Allium cernuum, Linum lewisii, Vicia americana, Artemisia frigida and Sphaeralacea coccinna. Opuntia fragilis is present in this type.

This type grades to the Green Needle Grass-Sage community at lower slope positions.

Needle Grass-Spear Grass. The Spear Grass community grades to this type at the upper-crest positions of south facing slopes. Soil

characteristics are similar to those for the preceeding community. The slope is less steep (22°) and the elevation is 475 m.

Stipa curtiseta predominates over Stipa comata in this community. Two herbs, Artemisia frigida and Vicia americana are relatively abundant. Koeleria macrantha and Poa sp. are other graminoids present. Erigeron glabellus, Tragopogon dubius, Allium cernuum and Sphaeralacea coccinna are also present.

Needle Grass-Wheat Grass. This community type occurs on the crest of the tributery creek's failed slopes, at 505 m asl. Soils are subxeric, well drained chernozems/brunisols/regosols on extreme (40°), south-east facing slopes.

Although there is a low shrub layer it is depauperate, consisting only of scattered Amelanchier alnifolia. Stipa curtiseta predominates over two Agropyron spp. Dwarf shrubs include Rosa acicularis, Symphoricarpos occidentalis, and Apocynum cannabinum. Galium boreale and Vicia americana are commonly present.

Porcupine Grass-Brome Grass. This community type occurs on the mid to lower, strong (20°) south facing slopes. Soils are subxeric, well-drained chernozems/brunisols.

Stipa spartea is by far the most abundant species. Bromus sp. is also prevalent. Herbs include Artemisia frigida, Vicia americana, Solidago missouriensis, Chenopodium leptophyllum, and Sphaeralacea coccinna.

Porcupine Grass-Kentucky Blue Grass-Sage. This community type is found on the gently rolling (10° southwest facing slopes) tableland on subxeric, well-drained soils. Inferred soils range from solodic to brunisols/ cherozems on glaciolacustire deposits at 520 m asl.

Stipa spartea is the predominant species. Poa pratensis and Artemisia frigida are also abundant. Other graminoids include Koeleria macrantha and Stipa occidentalis. Herbs include Solidago sp., Antennaria sp., Chrysopsis villosa, Potentilla hippiana, Arabis hirsuta and Oxytropis splendens.

Porcupine Grass-Northern Wheat Grass. This type occurs on slightly more mesic and gentler terrain (4° south facing slope) than the preceeding community. Inferred soils are submesic, well-drained chernozems/brunisols and solodic soils.

Stipa spartea and Agropyron dasystachyum are co-dominates. Agropyron trachycaulum is also present. Herbs include Artemisia frigida, Linum lewisii, Vicia americana, Achillea millefolium, Galium boreale, Campanula rotundifolia and Heuchera richardsonii.

Wheat Grass-Rose. This grass-shrub community occurs on the extreme slopes (40°) of old slump scars along the tributary creek valleys. Inferred soils are submesic, well-drained regosols on colluvial parent material at 420 m asl.

Agropyron is the dominant species. Rosa acicularis is prevalent in the dwarf shrub-herb layer and present to a limited extent in the low shrub layer. Eleagnus commutata is also present in the dwarf shrub-herb layer (Symphoricarpos, Allium, Galium boreale).

Wheat Grass-Saskatoon-Rose. This grass-shrub community is found on upper moderately rolling slopes (14° west) on subxeric, well-drained chernozems/brunisols (inferred).

This is a species rich community dominated by Agropyron and with Amelanchier alnifolia and Rosa acicularis, as associates, in the dwarf shrub-herb layer. These two shrubs are also found scattered in the low shrub layer. Other species present in the dwarf shrub-herb layer include Stipa sp., Vicia americana, Achillea millefolium, Galium boreale and Monarda fistulosa.

Kentucky Blue Grass. This grass community occurs on the toe (2° south facing slope) of the steep grassland slopes on submesic, moderately well drained soils at 400 m asl.

Poa pratensis is by far the predominant species. Agropyron trachycaulum, Artemisia ludoviciana and Symphoricarpos occidentalis are also prevalent species. Other graminoids include Stipa viridula, S. spartea and Agrostis scabra. Herbs include Artemisia frigida, Achillea millefolium, Vicia americana, Linum lewisii and Taraxacum officinale.

4.2.4 Wetlands

Natural wetlands are limited on the study area. The only examples present are at the base of very steep slopes (slump impoundments/backshore impoundments) and the narrow banks of the Peace River.

There are also two small man-made impoundments constructed on upper reaches of drainage draws. These cattle watering holes have heavily trampled shorelines and cover only a few (10-20) square metres.

Sedge Wetlands. This community type is restricted to very small alluvial backshore impoundments at the base of steep slopes/cliffs. Carex aquatilis is the dominant species in this species poor wetland. Associated species include Cicuta maculata and Juncus balticus. Scirpus validus and Calamagrostis canadensis are also present at lower cover values.

Man-made Water Impoundments. One of the two cattle watering impoundments is practically devoid of vegetation. The edge is heavily trampled and bare mineral soil (silt loam), two metres wide in extent encircles the shallow water (less than one metre deep). The only vegetation is Alisma plantago-aquatica ringing the open water.

The other impoundment is more diverse and is only heavily trampled at one end where an earth fill dam is located. Water depth is similar to the other watering pond. Vegetation consists of Calamagrostis sp., Beckmania schizachne, Equisetum fluviatile, Glyceria grandis, Carex rostrata, Carex aquatilis, Ranunculus macounii, Lemna minor, Eleocharis palustris and Salix sp.

Peace River Shoreline. The composition varies greatly from place to place, but generally is comprised of a silt (silt covered gravel at mouths of tributary creeks) foreshore abruptly altering to a two to four metre high cutbank. The vegetation sequence is usually dwarf Salix exigua grading to higher S. exigua with Equisetum, Carex stricta, Melilotus spp., Juncus balticus, Phleum pratense and Gentianella amarella commonly present. The cutbank usually has a narrow band of Cornus stolonifera and Salix sp.

4.2.5 Erosion Slopes

The steepest erosion slopes are to a large extent unvegetated. Vegetation is dominated by Artemisia ludoviciana and A. frigida. Other species include Arabis hirsuta, Astragalus aboriginum, Chenopodium album, Erigeron caespitosus and Agropyron trachycaulum.

4.3 Wildlife

Wildlife habitat within the study area is limited to basically two types: grassland and aspen woodland. Shrublands and spruce woods are present but limited in extent (less than 30 ha each). There are no significant wetlands on site (maximum size of a few square metres). The value of the site to wildlife is due to its proximity to the Peace River and its relatively undisturbed state amid land that has been extensively cleared and developed for agriculture, particularly the north bank of the Peace River.

Although classified as I-II winter range for moose, deer and elk (Canada Land Inventory nd.) only deer sign was encountered during the present study. Wildlife surveys (Alberta, Energy and Natural Resources, Fish and Wildlife Division 1984, 1981, 1979) have noted several mule deer in the vicinity of the site but no elk or moose. A large proportion of the site is range site type S1 which Adams (1981) classifies as primary (due to browse and early green up) mule deer

range. The small alluvial terrace is similarly rated. Moose sightings (Alberta, Energy and Natural Resources, Fish and Wildlife Division 1984, 1981, 1979) have been limited to the forested south bank of the Peace River in the study area vicinity. An occasional moose may cross the river and utilize the alluvial terrace woods and tributary creek valleys.

The study area is not included in any registered trapline (Myers, Public Lands Division, Jan. 1985, personal interview). Sightings of coyotes are fairly regular during ungulate surveys for the area (Alberta, Energy and Natural Resources, Fish and Wildlife Division 1984, 1981, 1979). Based on available habitat, red squirrel and snowshoe hare are probably the most abundant furbearers present. Transient bank beaver may utilize the poplar along the banks of the Peace River. One beaver was sighted swimming in the Peace River during the present study.

Waterfowl habitat is virtually non-existent due to absence of emergent aquatic vegetation and the hydrology of the tributary creeks. The creeks have high flow during spring runoff and minimal flow during summer. The Peace River does provide a nesting and stopover point for ducks and geese (Envirocon 1976).

Notable bird species encountered during the study include great horned owl (fledglings), red-tailed hawk, pileated woopecker and several warblers and sparrows. A complete annotated list appears in Appendix 4.

No amphibians or reptiles were observed during the study.

5. SIGNIFICANT FEATURES

For the purposes of this report, significant features are those physical/biological attributes of the study area that are good examples of representative characteristics of the Peace River Parkland or are unique (i.e. not widely distributed).

The following are the significant features present on the study area:

1. Steep slope grassland communities -- moderately disturbed due to grazing, but very diverse

2. Wooded tributary creek valleys -- valuable habitat in a region largely cleared for agriculture

3. Exposed Dunvegan sandstone outcrops -- a large proportion of this feature occurs between the two portions of the study area; used for geological research

4. Alluvial terrace -- only partially within study area but significant as most lower terraces along the Peace River have been cleared for agricultural purposes

6. RECOMMENDATIONS

The Peace River Parkland is one of the most impacted natural sections in the province, with little remaining native grassland left. The Natural Areas Program of the Public Lands Division, Energy and Natural Resources has identified only two other areas (Silver Valley and Highland Park) with steep slope grasslands with potential for conservation. Based on this, the following recommendations are made regarding the Dunvegan site:

1) The site (both portions) should remain under protective notation (PNT) as a conservation natural area, until a detailed survey of Highland Park and Fourth Creek sites are completed. If these sites are found to be similar but less impacted, then the PNT on the Dunvegan site may be dropped

2) As long as the PNT for conservation natural area remains, grazing be allowed to continue. If, after comparison with the other sites, Dunvegan becomes a preferred site, grazing should be phased out, particularly on the east portion [11, NE 2 (N/River) -80-4-W6] to allow the native grassland communities to revert to excellent condition

3) The carrying capacity for grazing of the site should be analyzed and implemented with the co-operation of the regional range management personnel, in accordance with Adams (1981) recommendations on grazing regimes for the Peace River slopes. Grazing has been a recent historical (since 1930s) use of the area and under proper management, should continue for the interim

4) Other steep slope grasslands along the Peace River (Highland Park, Fourth Creek) should also be surveyed for conservation potential

APPENDIX 1

APPENDIX 1

GRAZING HISTORY OF SECTION 11-80-4-W6

Year	Number of Animals Grazed	
	Cows	Horses
1932	School Lands Grazing Permit	
1934	45	9
1935	50	8
1936	55	11
1937	75	11
1938	75	10
1939	69	12
1940	50	12
1941	45	12
1942	31	9
1943	50	12
1944	33	14
1945	34	12
1946	39	13
1947	29	12
1948	60	12
1949	50	12
1950 to 1956	No Data Available	
1957	46	7
1958 to Present	No Data Available	

Source: Land File NE 11-80-4-W6, Public Lands Division, Alberta Energy and Natural Resources

APPENDIX 2

ANNOTATED LIST OF VASCULAR PLANTS FOR THE DUNVEGAN STUDY AREA

EQUISETACEAE (Horsetail Family)

Equisetum arvense L.: a. creek valley mixedwoods and alluvial woodlands
Equisetum fluviatile L.: o. impoundment pond
Equisetum hyemale L.: o. river shoreline
Equisetum palustre L.: o. river shoreline
Equisetum pratense Erh.: o. alluvial aspen-birch-spruce woodland

CUPRESSACEAE

Juniperus horizontalis Moench.: r. knoll on upper rolling slopes

PINACEAE (Pine Family)

Picea glauca (Moench) Voss: a. alluvial terrace and creek valley bottoms
Z Picea mariana (Mill.) BSP.: not noted during present survey
Pinus contorta Loudon: o. middle terrace

ALISMATACEAE

Alisma plantago-aquatica L.: o. impoundment pond

GRAMINIAE (Grass Family)

Agropyron dasystachyum (Hook.) Seribn.: a. steep south facing slopes
I Agropyron repens (L.) Beauv.: o. river shoreline
Agropyron trachycaulum var. unilaterale (Cassidy (Malte): c. grassland slopes, slope shrublands
Agrostis scabra L.: o. bluegrass grassland at toe of slope
Beckmannia syzigachne (Steud.) Fern.: o. river shoreline and impoundments
Bromus anomalous Rupr. ex Fourr.: o. west facing slope shrublands
Bromus ciliatus L.: o. seral mixedwood in creek valley bottom
I Bromus inermis Leyss. ssp inermus: a. river shoreline
Calamagrostis canadensis (Michx.) Beauv.: c. slump impoundments
Calamagrostis inexpansa A. Gray.: o. river shoreline
Calamagrostis stricta (Timm) Koeler: o. river shoreline
Danthonia californica Boland.: o. aspen woodland on middle terrace
Elymus innovatus Beal.: c. creek valley woodlands
Z Festuca sp.: r? hair grass-strawberry grassland
Glyceria grandis S. Wats ex A. Gray.: o. impoundment pond
Hordeum jubatum L.: o. upper valley slopes
Koeleria macrantha (Ledeb.) J.A. Schultes f.: o. grasslands
Phleum pratense L.: o. river shoreline

Poa palustris L.: c. slope shrublands and river shoreline
Poa pratensis L.: a. needle grass slope and level grasslands
Stipa columbiana Macoun: o. upper porcupine grass grassland
E Stipa comata Trin. & Rupr.: a. upper porcupine grass grassland
Stipa curtiseta (A.S. Hitche.) Barkworth: a. south facing grasslands and shrublands
Stipa spartea Trin.: a. steeper south facing slope grasslands
Stipa viridula Trin.: a. upper south facing slope grasslands

CYPERACEAE (Sedge Family)
Carex aquatilis Wahlen b.: a. impoundment pond, slump impoundment
Carex rostrata Stokes: c. impoundment pond
Eleocharis palustris (L.) R. and S.: c. impoundment pond, river shoreline
Scirpus microcarpus Presl: o. slump impoundment
Scirpus validus Vahl: o. slump impoundment

JUNCACEAE
M Juncus balticus Willd.: c. slump impoundment

LILIACEAE
Allium cernuum Roth.: c. slope shrublands, grasslands
Disporum trachycarpum Saliob.: o. aspen woodland on middle terrace
Lilium philadelphicum L.: o. grassland
Smilacina trifolia (L.) Desf.: o. mixedwood in creek valley bottom
Smilacina stellata (L.) Desf.: o. valley aspen and mixedwoods and slope shrublands

ORCHIDACEAE (Orchid Family)
Habenaria viridis (L.) R.Br.: r. terrace woodland

SALICACEAE (Willow Family)
Populus balsamifera L.: c. alluvial terrace and lower creek valley
Populus tremuloides Michx.: a. upper rolling slopes, creek valleys and middle terrace
Salix bebbiana Sarg.: c. mixedwoods in creek valley bottoms
Salix exigua Nutt.: c. river shoreline

BETULACEAE (Birch Family)
Alnus tenuifolia Nutt.: o. river shoreline
Betula papyrifera Marsh.: o. alluvial terrace and creek valley bottoms

SANTALACEAE (Sandalwood Family)
Commandra umbellata Nutt.: o. grasslands

POLYGONACEAE (Buckwheat Family)
Rumex occidentalis S. Wats.: o. slump impoundment
Rumex triangulivalis (Dans.) Rech. f.: o. river shoreline

CHENOPODIACEAE (Goosefoot Family)
I Chenopodium album L. var. beer: o. steep grassland slopes
E Chenopodium leptophyllum (Nutt. ex Moq) S. Wats.: o. toe of needle grass grassland slope

CARYOPHYLLACEAE (Pink Family)
Stellaria longipes Goldie: o. upper valley slopes

RANUNCULACEAE
Actaea rubra (Ait.) Willd.: o. open aspen woodland on middle terrace
Anemone cylindrica A. Gray: c. slope shrublands
Anemone multifida Poir.: o. grassland
Clematis occidentalis (Hornem.) DC.: o. middle terrace woodlands
Ranunculus cymbalaria Pursh: o. grassland slopes
Ranunculus macounii Britt.: o. slump impoundment edges
Thalictrum venulosum Trel.: o. aspen woodland and west facing shrubland slopes

CRUCIFERAE (Mustard Family)
Arabis hirsuta ssp. pycnocarpa (Hopkins): o. upper Stipa spartea grassland slopes
I Capsella bursa-pastoris (L.) Medic.: o. river shoreline
Erysimum inconspicuum (S. Wats) MacM.: o. steep grassland slopes
Lepidium denisflorum Schrad.: river shoreline
M Rorippa palustris (L.) Besser: o. impoundment pond

SAXIFRAGACEAE (Saxifrage Family)
Heuchera richardsonii R. Br.: o. open shrubland-heath on middle terrace

GROSSULARIACEAE (Current or Gooseberry Family)
Ribes oxyacanthoides L.: o. creek valley bottom woodlands
Ribes triste Pall.: o. mixedwoods along creek valley bottom

ROSACEAE
Amelanchier alnifolia Nutt.: a. woodlands and slope drainage draws
Fragaria virginiana Duchesne: c. woodlands
Geum triflorum Pursh.: o. upper grassland slopes
Potentilla anserina L.: o. river shoreline
Potentilla arguta Pursh: o. open aspen-heath woodland on middle terrace
L Potentilla hippiana Lehm.: o. upper rolling grassland slopes
Potentilla pensylvanica L.: o. grassland on toe of slope
Prunus virginiana L.: c. woodlands
Rosa acicularis Lindl.: a. shrubland slopes
Rosa woodsii Lindl.: c. woodlands and slope shrublands
Rubus idaeus L.: o. lower slope mixedwoods

LEGUMINOSAE (Pea Family)
L Astragalus aboriginum Richards.: o. steep needle grass grasslands slopes
Astragalus striatus Nutt.: o. steep green needle grass grassland slopes
Astragalus tenellus Pursh: o. upper grassland slopes
Lathyrus ochroleucus Hook.: c. mixedwoods, shrublands, grasslands
M,I Melilotus alba Desr.: o. river shoreline, upper grassland slopes
I Melilotus officinalis (L.) Lam.: o. river shoreline, upper grassland slopes

Oxytropis sericea Nutt.: o. upper grassland slopes
Oxytropis splendens Dougl. ex Hook.: o. shrubland slopes
Trifolium hybridum L.: o. river shoreline
Vicia americana Muhl.: c. shrubland slopes, woodlands, grasslands

LINACEAE (Flax Family)
Linum lewisii Pursh: o. upper grassland slopes

MALVACEAE
L Sphaeralcea coccinea (Pursh) Rydb.: uc. grasslands

VIOLACEAE
Viola canadensis L.: uc. moist woodlands

CACTACEAE (Cactus Family)
Opuntia fragilis (Nutt.) Haw.: uc. erosion slopes, steep grasslands

ELEAGNACEAE (Oleaster Family)
Eleagnus commutata Bernh. ex Rud 6.: o. shrubland in drainage draws
Shepherdia canadensis (L.) Nutt.: o. aspen woodlands

ARALIACEAE (Ginseng Family)
Aralia nudicaulis L.: o. moist woodlands

UMBELLIFERAE (Carrot Family)
Cicuta maculata L.: a. slump impoundment
Zizia aptera (A. Gray) Fern: o. slump impoundment

CORNACEAE (Dogwood Family)
Cornus canadensis L.: o. mixedwoods
Cornus stolonifera Michx.: a. aspen woodlands and mixedwoods

PYRDLACEAE (Wintergreen Family)
Pyrola asarifolia Michx.: o. mixedwoods

ERICACEAE (Heath Family)
Arctostaphylos uva-ursi (L.) Spreng.: a. open aspen woodland

PRIMULACEAE (Primrose Family)
Androsace septentrionalis L.: a. upper rolling grassland

APOCYNACEAE (Dogbane Family)
Apocynum androsaemifolium L.: c. open aspend woodland on middle terrace
M,L Apocynum cannabinum L.: o. aspen woodland on valley slope

GENTIANACEAE (Gentian Family)
Gentianella amarella ssp. acuta (Michx.) Gillett: c. river shoreline

ASCELPIADACEAE (Milkweed Family)
L Asclepias ovalifolia Dcne.: r? drainage draw of slopes?

BORAGINACEAE (Borage Family)
I Lappula squarrosa (Retz.) Dumort.: o. upper rolling grassland slopes

LABIATAE (Mint Family)
Mentha arvensis L.: c. river shoreline
Monarda fistulosa L.: c. edge of slope shrublands
Stachys palustris L.: o. river shoreline

SCROPHULARIACEAE (Figwort Family)
Orthocarpus luteus Nutt.: o. grassland
L Penstemon gracilis Nutt.: o. grassland on middle terrace
Penstemon procerus Dougl. ex Grah.: o. grassland at base of slope

PLANTAGINACEAE (Plantain Family)
I Plantago major L.: o. river shoreline

RUBIACEAE (Madder Family)
Galium triflorum Michx.: o. mixedwoods

CAPRIFOLIACEAE (Honeysuckle Family)
Linnaea borealis L.: c. spruce woodland on middle terrace
Lonicera dioica L.: o. open aspen-heath on middle terrace
Symphoricarpos albus (L.) Blake: c. woodlands, shrubland drainage draws
Symphoricarpos occidentalis Hook.: a. shrubland drainage draws
Vibernum edule (Michx.) Raf.: c. alluvial woodland, aspen on valley slopes

CAMPANULACEAE (Bluebell Family)
Campanula rotundifolia L.: c. shrubland drainage draws, aspen woodlands and grassland slopes

COMPOSITAE (Composite Family)
M Achillea millefolium L.: c. grasslands, drainage draw shrublands
Achillea sibirica Ledeb.: o. river shoreline
L Antennaria aprica Greene: o. upper rolling grassland slopes
Artemisia campestris L. ssp. caud.: o. aspen-heath on middle terrace
Artemisia dracunculus L.: o. steep erosion slopes
I Artemisia frigida Willd.: a. steep slopes
M Artemisia longifolia Nutt.: o. steep erosion slopes
I Artemisia ludoviciana var. gnaphalodes (Nutt.) T. and G.: o. grassland slopes
Aster ciliolatus Lindl.: o. drainage draw shrublands
Aster conspicuus Lindl.: river shoreline, aspen woodland
Aster ericoides L.: o. steep slope grasslands, erosion slopes
Z Aster falcatus Lindl.: r? June grass-wheat grass grassland
Aster laevis L.: o. aspen woodland on middle terrace
I Crepis tectorum L.: o. upper rolling grassland slopes
Erigeron caespitosus Nutt,: c. steep needlegrass grassland
Erigeron glabellus Nutt. ssp. glabellus: steep needlegrass grassland, drainage draw shrubland

Erigeron glabellus ssp. pubescens [Hook, Cronq. (E. asper Nutt!)]: a. grassland

E Gutierrezia sarathrae (Pursh) Britt. and Rusby: uc. steep needlegrass grassland slope

E Heterotheca villosa (Pursh) Shinners: o. steep needlegrass grassland

Senecio streptanthifolius Greene: o. grasslands

Solidago gigantea Ait.: o. upper rolling grassland slopes

Solidago missouriensis Nutt.: c. steep slope grassland

Solidago spathulata DC.: o. upper rolling shrublands

Taraxacum officinale Weber: o. river shoreline, toe of grassland slope

Tragopogon dubius Scop.: c. slope grassland

NOTE: Nomenclature and order follow Moss (1983)
Abbreviations used

- E - extended range for collected species (according to distribution map in Moss (1983)
- I - introduced species according to Moss (1983)
- L - limited reported collections for species in region as indicated by distribution maps in Moss (1983)
- M - specimen deposited in Natural Areas Herbarium
- Z - species noted by Zirul (1970) but not recorded by the present study

Abundance Codes

- a - abundant - species most likely to be observed in high numbers
- c - common - species likely to be observed but less frequently or in fewer numbers than abundant species
- o - occasional - species present in fewer numbers than common species
- uc - uncommon - species only observed infrequently in low numbers
- r - rare - species only observed very infrequently

APPENDIX 3

ANNOTATED LIST OF NON-VASCULAR PLANTS FOR THE DUNVEGAN STUDY AREA

MOSSES

AMBLYSTEGIACEAE
Drepanocladus uncinatus: uc. spruce woodlands

THUIDIACEAE
Thuidium abietinum: uc. spruce woodlands

BRACHYTHECIACEAE
Brachythecium salebrosum: uc. spruce woodlands
Eurhynchium pulchellum: o. spruce woodlands

ENTODONTACEAE
Pleurozium schreberi: c. spruce woodlands, mixedwoods

HYPNACEAE
Ptilium crista-castrensis: o. spruce woodlands, mixedwoods

HYLOCOMNIACEAE
Hylocomnium splendens: o. spruce woodlands

LICHENS

CLADONIACEAE
Cladonia botrytes: uc. spruce woodlands
Cladonia chlorophaea: uc. mixedwoods
Cladonia gracilis: uc. spruce woodlands, mixedwoods
Cladonia rangeriferina: uc. mixedwoods

PELTIGERACEAE
Peltigera canina: o. woodlands, shrublands

USNEACEAE
Usnea sp.: c. spruce woodlands

PARMELIACEAE
Parmelia sulcata: uc. epiphyte on trees, spruce woodlands

NOTE: Nomenclature follows Conrad (1979) for mosses and Hale (1969) for lichens

c - common
o - occasional
uc - uncommon

APPENDIX 4

ANNOTATED LIST OF BIRDS OBSERVED IN THE VICINITY OF THE DUNVEGAN STUDY AREA

Waterfowl [Order Anseriformes]
- Canada goose (Branta canadensis): uc. 1 sighted on Peace River
- Mallard (Anas platyrhynchos): uc. 2 sighted on Peace River
- Northern Shoveler (Anas clypeata): uc. flock of 7 sighted on Peace River
- Barrow's Goldeneye (Bucephala islandica): uc. 3 sighted on Peace River

Hawks [Order Falconiformes]
- Red-tailed hawk (Buteo jamaicensis): fc. 1 sighted over creek valley
- Swainson's hawk (Buteo swainsoni): uc. 1 sighted over site
- American kestrel (Falco sparverius): uc. 1 sighted in spruce woodland

Gallinaceous birds [Order Galliformes]
- Sharp-tailed grouse (Pedioecetes phasianellus): uc. 1 sighted on upper rolling slopes

Shorebirds [Order Charadriiformes]
- Spotted sandpiper (Actitis macularia): fc. 1 sighted along river shoreline

Owls [Order Strigiformes]
- Great-horned owl (Bubo virginianus): uc. 3 fledglings sighted at mouth of Boucher Creek

Goatsuckers [Order Caprimulgiformes]
- Common nighthawk (Chordeiles minor): uc. 1 sighted above area

Woodpeckers [Order Piciformes]
- Common flicker (Colaptes auratus): fc. 2 sighted in aspen shrubland
- Pileated woodpecker (Dryocopus pileatus): uc. 1 hole sighted in alluvial woodland
- Yellow-bellied sapsucker (Sphyrapicus varius): uc. 1 sighted along creek valley
- Downy woodpecker (Dendrocopos pubescens): uc. 1 sighted in aspen groves

Perching birds [Order Passeriformes]

Eastern kingbird (Tyrannus tyrannus): uc. 1 in aspen grove adjacent to area

Least flycatcher (Empidonax minimus): c. 6 sighted/heard in aspen woodland/groves

Olive-sided flycatcher (Nattallornis borealis): c. 5 heard in aspen-shrub

Blue jay (Cyanocitta cristata): uc. 1 sighted in aspen-spruce along creek

Black-billed magpie (Pica pica): c. 5 sighted in aspen-shrub and aspen-spruce

American crow (Corvus brachyrhynchos): uc. 1 sighted on adjacent agricultural land

Black-capped chickadee (Parus atricapillus): c. 3 heard/sighted in creek valley woodlands

American robin (Turdus migratorius): c. 4 sighted/heard in aspen-shrub

Hermit thrush (Catharus guttatus): uc. 1 heard in mixedwoods

Swainson's thrush (Catharus ustulatus): c. 1 heard in aspen-spruce

Tennessee warbler (Vermivora peregrina): fc. 2 heard in aspen-shrub along creek

Orange-crowned warbler (Vermivora celata): uc. 2 possible sightings in aspen-shrub and aspen-spruce

Yellow warbler (Deudroica petechia): c. 6 heard/sighted along creek

Blackpoll warbler (Deudroica striata): uc. 1 sighted in shrub

Wilson's warbler (Wilsonia pusilla): uc. 1 sighted along wooded creek

Western meadowlark (Sturnella neglecta): fc. 3 sighted in aspen-shrub groves

Red-winged blackbird (Agelaius phoeniceus): uc. 1 sighted in aspen grove

Rose-breasted grosbeak (Pheucticus ludovicianus): uc. 1 sighted in aspen-spruce

Vesper sparrow (Pooecetes gramineus): fc. 2 heard in grassland-shrub and aspen-shrub

Chipping sparrow (Spizella passerina): uc. 1 heard in mixedwoods

Clay-colored sparrow (Spizella pallida): c. 5 heard/sighted in aspen-shrub groves

White-throated sparrow (Zonotrichia albicollis): c. 4 heard in aspen-shrub

Song sparrow (Melospiza melodia): c. 6 heard in aspen-shrub groves

NOTE: All observations by John Rintoul and recorded by John Sisson. Common and scientific names follow Salt and Salt 1976 with changes from N. American Checklists of Birds [in Alberta Naturalist 13(1). March 1983].

Approximately 114 sightings (or song identified) of 38 species during the study.

Abundance codes:

c	common	birds most likely to be observed on an outing
fc	fairly common	birds readily observed but not as frequently or in as high numbers as common species
uc	uncommon	seen less frequently than fairly common species
o	occasional	observed over a season
r	rare	not necessarily observed over a season

APPENDIX 5

LAND STATUS AUTOMATED SYSTEM (LSAS)
RESERVATION AND SURFACE DISPOSITION DETAIL

ACTIVITIES

ACTIVITY	STATUS/TYPE / LAND ID	DATE	HECTARES	EXPIRY	ACRES	CLIENT/INTERIM REMARKS / METES AND BOUNDS REMARKS	AREA IN HECTARES IN STANDING	AREA IN HECTARES TOTAL
EZE-1077	DISPOSED E-04-080-15-SW	ON 1977-AUG-18				TRANSALTA UTILITIES CORPORATION	0.000	0.000
EZE-1078	DISPOSED E-04-080-10-NW	ON 1956-JAN-11				ALBERTA POWER LIMITED	0.000	0.000
EZE-1080	DISPOSED E-04-080-10-NW	ON 1956-JAN-11				ALBERTA POWER LIMITED	0.000	0.000
EZE-820136	DISPOSED E-04-080-10-NW E-04-080-15-SW	ON 1982-DEC-10		9999-999-99		ALBERTA POWER LIMITED	0.000	0.595
GRL-31506	DISPOSED E-04-080-02-NE E-04-080-10-NW E-04-080-11-SE E-04-080-11-SW E-04-080-11-NW E-04-080-11-NE E-04-080-15-SW			1986-FEB-28		MACARTHUR, RICHARD EDWARDS PT LYING N&E/LT BANK/RIVER LYING N&E/LT BANK/RIVER LYING N&E/LT BANK/RIVER LYING N&E/LT BANK/RIVER	0.000	5-1.81?
LOC-493	DISPOSED E-04-080-10-NW	ON 1954-SEP-01	2.821	9999-999-99	6.97	ALBERTA POWER LIMITED	2.821	2.821
PAT-840001	APPROVED 0333 RECREATIONAL NATURAL AREA POTENTIAL E-04-080-10-NW E-04-080-15-SW	ON 1984-JAN-09	23.674 64.750	1989-JAN-31	58.50 160.00	ENERGY AND NATURAL RESOURCES, DEP 3 NC AGRICULTURAL DISPOS 100 CRAZING/PAYING 710 SEE COMMENTS 730 CONSENT REQRD N/RIVER	98.424	98.424
PAT-840002	APPROVED 0333 RECREATIONAL NATURAL AREA POTENTIAL E-04-080-02-NE E-04-080-11-SE E-04-080-11-SW E-04-080-11-NW E-04-080-11-NE	ON 1984-JAN-09	14.569 64.021 26.305 64.750 64.750	1989-JAN-31	36.00 158.20 65.00 160.00 160.00	ENERGY AND NATURAL RESOURCES, DEP 3 NC AGRICULTURAL DISPOS 100 CRAZING/PAYING 710 SEE COMMENTS 730 CONSENT REQRD N/RIVER N/RIVER N/RIVER	234.355	234.394

APPENDIX 6

VEGETATION STAND TABLES

VEGETATION TABLES

PUBLIC LANDS

EDMONTON, ALBERTA

13:46:32 AUG 21, 1985

NO CODING ERRORS IN DATA SET

TOTAL NUMBER OF PLOTS IS 93

TOTAL NUMBER OF SPECIES IN EACH LAYER IS 7 8 0 15 29 271 0 59 0

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON WED AUG 21/85 12:58:22 PART 1 OF 2

VEGETATION PLOT NUMBER	JR84 010	JR84 011	JR84 012	JR84 013	JR84 014	JR84 015	JR84 016	JR84 017	JR84 018	JR84 019	JR84 020	JR84 021	JR84 022	JR84 023	JR84 024	JR84 025	JR84 026	JR84 027	JR84 028	JR84 029
PROJECT IDENTIFICATION	DUNV EG	DUNV EG	DUNV EG	DUNV EG	DUNV EG	DUNV EG	DUNV EG	DUNV EG	DUNV EG	ERIN LG	ERIN LG	ERIN LG	ERIN LG	ERIN LG	ERIN LG	ERIN LG	ERIN LG	ERIN LG	ERIN LG	ERIN LG
LEGAL	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6	080 04W6
BIOGEOGRAPHICAL ZONE	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	PP
IBP CODE	2- 22	2- 22	2- 22	2- 22	2- 22	2- 22	2- 22	2- 22	2- 22											
VEGETATION TYPE																				
LANDFORM	FILI	FILI	FILI	F LI	F MI	FLSI	FLSI	F II	F II	F MI	F SI	F II	F II	F SI	F II	F II	F II	F II	F II	F SI
ELEVATION (M)	335	335	350	380	400	425	460	475	475	535	520	505	460	505	520	520	365	365	400	445
SLOPE (DEGREES)	00	00	00	00	20	26	40	22	14	04	40	20	28	40	10	10	02	02	02	20
ASPECT	00	00	00	00	SW	SW	SW	S	W	S	W	W	W	SE	SW	SW	S	S	S	S
SOIL	RR			BC	BC		BC	BC	BC											
MOISTURE REGIME	7	9	6	5	5	2	2	2	3	4	4	4	4	3	3	4	5	4	4	3
DRAINAGE	5	6	4	3	3	1	1	1	2	2	2	3	2	2	2	2	3	3	3	2
SITE POSITION	7	6	5	5	3	3	2	1	1	1	2	3	4	2	2	2	5	4	5	4
STABILITY INDEX	4	5	3	3	3	6	6	6	4	4	3	3	3	4	4	3	3	3	4	4
MICROTOPOGRAPHY	3	2	2	2	2	2	2	1	2	1	2	2	2	1	1	1	2	2	1	1
ROCK	.1	00	00	00	00	00	01	00	00	00	00	00	00	00	00	00	00	00	00	00
HUMUS	05	50	85	85	85	25	05	05	05	80	30	80	85	85	85	85	80	90	75	85
MINERAL SOIL	10	00	00	00	00	15	25	01	00	00	15	00	05	05	01	00	00	00	00	00
DEAD FALL	10	00	05	02	02	00	00	00	00	00	00	00	05	00	00	00	00	00	00	00
WATER	00	45	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
TOTAL UNVEGETATED	05	10	00	05	02	15	20	05	02	05	15	00	60	05	01	01	05	20	10	05
TREE CANOPY I	00	00	03	01	25	00	00	00	00	00	00	00	20	00	00	00	70	20	00	00
TREE CANOPY II	00	00	02	04	00	00	00	00	00	00	00	00	15	00	00	00	00	60	00	00
SHRUB CANOPY I	00	00	02	12	12	00	00	00	00	00	00	00	01	00	00	00	06	00	00	00
SHRUB CANOPY II	10	00	72	09	13	00	00	00	02	00	03	75	03	02	00	51	64	00	00	00
HERB-DWARF SHRUB	75	47	06	20	08	60	59	88	54	80	85	30	09	59	98	83	28	01	83	74
BRYOID	00	00	.1	.1	.5	00	00	00	00	00	00	00	.5	00	00	00	00	02	00	00

VEGETATION STAND TABLE

NATURAL AREAS PROGRAM--ALBERTA ENERGY AND NATURAL RESOURCES RUN ON WED AUG 21/85 12:58:22 PART 2 OF 2

VEGETATION PLOT NUMBER	JR84 055	JR84 056	JR84 057
PROJECT IDENTIFICATION	ERIN LG	ERIN LG	ERIN LG
LEGAL	080 04W6	080 04W6	080 04W6
BIOGEOGRAPHICAL ZONE	PP	PP	PP
IBP CODE			
VEGETATION TYPE			
LANDFORM	F MI	F II	F LI
ELEVATION (M)	365	365	350
SLOPE (DEGREES)	05	10	00
ASPECT	N	SW	00
SOIL			
MOISTURE REGIME	4	4	5
DRAINAGE	2	2	3
SITE POSITION	5	4	5
STABILITY INDEX	3	4	3
MICROTOPOGRAPHY	2	2	2
ROCK	00	.5	00
HUMUS	85	75	90
MINERAL SOIL	00	00	00
DEAD FALL	01	00	10
WATER	00	00	00
TOTAL UNVEGETATED	05	05	10
TREE CANOPY I	01	00	60
TREE CANOPY II	10	00	25
SHRUB CANOPY I	15	00	01
SHRUB CANOPY II	15	01	02
HERB-DWARF SHRUB	80	80	07
BRYOID	.1	.1	03

$signoff

University of Alberta

LEVEL	ZONE	ASSC	TYPE
ECOSYM UNIT	PRPARK		1

TRIAL GROUP #1/1

PRESENCE (%P), MEAN COVER (MC), PERCENT COVER (%C)

PUBLIC LANDS
EDMONTON, ALBERTA
13:46:32 AUG 21, 1985
TABLE 1 PAGE 1

PLOT NUMBER	AVERAGE VALUE		JR84 010	JR84 011	JR84 012	JR84 013	JR84 014	JR84 015	JR84 016	JR84 017	JR84 018	JR84 019	JR84 020	JR84 021	JR84 022	JR84 023	JR84 024
NUMBER OF SPECIES PER PLOT	18.0		19	6	29	31	18	19	15	12	16	16	14	16	25	7	18
SPECIES	%P	MC	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C
A1 LAYER																	
1 PICE GLA	21.7	4.4			01												
2 POPU TRE	13.0	4.2				01	25								20		
3 BETU NEO	8.7	0.0			.5	.5											
4 POPU BAL	4.3	0.1			02												
A2 LAYER																	
PICE GLA	17.4	4.0				01											
POPU TRE	13.0	0.5				02									05		
POPU BAL	8.7	0.5			.5												
BETU NEO	8.7	0.1			02	01									10		
B1 LAYER																	
POPU TRE	13.0	0.9				05											
5 AMEL ALN	13.0	0.5			01		05										
6 CORN STO	8.7	0.3			01	05											
7 PRUN VIR	8.7	0.3			.5		07										
8 SALI BEB	4.3	0.1				02											
PICE GLA	4.3	0.0			.5												
9 SALI PLA	4.3	0.0															
10 SALI SP.	4.3	0.0													01		
B2 LAYER																	
AMEL ALN	39.1	3.5				.5	04				01			40		02	
11 ROSA ACI	34.8	4.0			20						01		05	30			
12 ROSA WOO	21.7	2.8				02	02								01		
CORN STO	17.4	2.5			50	04	03								01		
PRUN VIR	13.0	0.4				.5	04							05			
13 SHEP CAN	13.0	0.1													01		
14 VIBU EDU	8.7	0.1			.5	01											
PICE GLA	8.7	0.0			.5												
15 RUBU IDA	8.7	0.0			.5	.5									.5		
16 SALI EXI	4.3	0.2	05														
POPU TRE	4.3	0.1															
BETU NEO	4.3	0.0				.5											
17 ELAE COM	4.3	0.0											01				
POPU BAL	4.3	0.0			.5												
18 SYMP OCC	4.3	0.0															
C LAYER																	
19 VICI AME	82.6	1.6	.5		.5	01	.5	.5	05	10	01	02		10	.5	01	.5
20 GALI BOR	65.2	1.4				.5	.5	.5	.5		05	01	02	02	.5	02	
ROSA ACI	47.8	2.7							01		10		30	05		05	.5
21 SYMP ALB	43.5	0.4			.5	.5	01							.5	.5	03	.5
22 STIP CUR	39.1	9.3						.5		35		40				30	45
23 ARTE FRI	34.8	1.4						05	.5	10		.5	.5				15
24 ACHI MIL	34.8	0.2									01	.5	.5	01			
25 CAMP ROT	30.4	0.2						.5			.5	.5					
26 LINU LEW	30.4	0.2						.5	01			01	.5				
27 FRAG VIR	26.1	0.4			.5	.5								.5	01		
28 KOEL MAC	26.1	0.3						.5	.5	.1		.5					05
29 ALLI CER	26.1	0.2						.5	01	.5		.5	01				

University of Alberta

LEVEL	ZONE	ASSC	TYPE
ECOSYM UNIT	PRPARK		1

TRIAL GROUP #1/1

PRESENCE (%P), MEAN COVER (MC), PERCENT COVER (%C)

PUBLIC LANDS
EDMONTON, ALBERTA
13:46:32 AUG 21, 1985
TABLE 1 PAGE 2

PLOT NUMBER	AVERAGE VALUE		JR84 010	JR84 011	JR84 012	JR84 013	JR84 014	JR84 015	JR84 016	JR84 017	JR84 018	JR84 019	JR84 020	JR84 021	JR84 022	JR84 023	JR84 024
NUMBER OF SPECIES PER PLOT	18.0		19	6	29	31	18	19	15	12	16	16	14	16	25	7	18
SPECIES	%P	MC	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C
30 MAIA CAN	26.1	0.2			.5	.1	.5										
31 SOLI MIS	26.1	0.1						.5		.5		.5	.5				
SYMP OCC	21.7	2.2			.5		02						02	02			.5
32 GRAS SP.	21.7	0.8						01				.5			.5		
ROSA WOO	21.7	0.6			.5										.5		
33 LATH OCH	21.7	0.2									01			01			
34 MONA FIS	21.7	0.2			.5									.5	.1		
35 SMIL STE	21.7	0.1				10	01				05			01	02		
36 AGRO TRA	17.4	0.7								.5							02
37 ARAL NUD	17.4	0.6									01	01					.5
38 ERIG GLA	17.4	0.2			.5		.5								.5		
39 GEUM TRI	17.4	0.1				.5									.5		
40 RIBE OXY	17.4	0.1			.5	.5	.5										20
VIBU EDU	13.0	4.3						50							02		
41 POA PRA	13.0	2.3	40		.5												
42 STIP VIR	13.0	1.8						01	.5			30					
43 EQUI ARV	13.0	1.4								25	01						
44 AGRO DAS	13.0	1.2						01	10	05		02					
45 STIP SP.	13.0	0.7				.5											
46 POA SP.	13.0	0.3						.5								04	.1
47 AGRO TVU	13.0	0.2			.5												
48 ARAB HIR	13.0	0.2						01	01			.5					
49 LINN BOR	13.0	0.1							.5	.5							
50 ERIG CAE	13.0	0.1						01		.5	01						
51 SPHA COC	13.0	0.1	.5														
52 TARA OFF	13.0	0.1						01		.5	01						
53 TRAG DUB	8.7	3.9									15		50				
54 ARCT UVA	8.7	2.8							35				.5				
55 AGRP SP.	8.7	1.5									10						
AMEL ALN	8.7	1.1															
56 STIP COM	8.7	0.7	15														
57 BROM INE	8.7	0.5															
58 ANDR SEP	8.7	0.5				.5											10
59 BROM CIL	8.7	0.1															
60 AGRO SCA	8.7	0.1															
61 ASTE SP.	8.7	0.1								.5	01						
62 ASTR ABO	8.7	0.1						.5	01								
63 CALA CAN	8.7	0.1	.5	01													
64 MELI ALB	8.7	0.1						.5	01								
65 ASTE CON	8.7	0.0	.1														
66 HEUC RIC	8.7	0.0										.5					
67 OXYT SPL	8.7	0.0															
POPU TRE	8.7	0.0															.5
68 PYRO ASA	8.7	0.0			.5										.1		
69 RANU SP.	8.7	0.0													.5		
RUBU IDA	8.7	0.0			.5								.5				.5
70 THAL VEN	8.7	0.0													.5		
71 CARE AQU	4.3	1.3		30										.5			

LEVEL	ZONE	ASSC	TYPE
ECOSYM UNIT	PRPARK		1

TRIAL GROUP #1/1

PRESENCE (%P), MEAN COVER (MC), PERCENT COVER (%C)

PUBLIC LANDS
EDMONTON, ALBERTA
13:46:32 AUG 21, 1985
TABLE 1 PAGE 3

PLOT NUMBER	AVERAGE VALUE		JR84 010	JR84 011	JR84 012	JR84 013	JR84 014	JR84 015	JR84 016	JR84 017	JR84 018	JR84 019	JR84 020	JR84 021	JR84 022	JR84 023	JR84 024
NUMBER OF SPECIES PER PLOT	18.0		19	6	29	31	18	19	15	12	16	16	14	16	25	7	18
SPECIES	%P	MC	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C
72 BROM SP.	4.3	0.4															
73 CICU MAC	4.3	0.4		10													
74 ARTE LUD	4.3	0.2															
75 ELYM INN	4.3	0.2				05											
76 JUNC BAL	4.3	0.2		05													
PRUN VIR	4.3	0.2												05			
77 APOC AND	4.3	0.1															
78 OXYT SP.	4.3	0.1									02						
79 ACHI SIB	4.3	0.0	.1														.
80 ACTA RUB	4.3	0.0					01										
81 AGRO REP	4.3	0.0	01														
82 ALNU TEN	4.3	0.0	.5														
83 ANEM CYL	4.3	0.0															
84 ANEM MUL	4.3	0.0															
85 APOC CAN	4.3	0.0					.5										
86 ARTE CAM	4.3	0.0															
87 ASTE CIL	4.3	0.0											.5				
88 ASTE LAE	4.3	0.0															
89 ASTR STR	4.3	0.0						.5									
90 BECK SYZ	4.3	0.0	.5														
91 BROM ANO	4.3	0.0												01			
92 CALA INE	4.3	0.0	.5														
93 CHEN LEP	4.3	0.0															
94 CORN CAN	4.3	0.0				.5											
95 DANT CAL	4.3	0.0															
96 DISP TRA	4.3	0.0					.5										
97 EPIL SP.	4.3	0.0				.5											
98 EQUI PRA	4.3	0.0				.5											
99 GALI TRI	4.3	0.0			.5												
100 GUTI SAR	4.3	0.0															
101 HORD JUB	4.3	0.0	.5														
102 LONI DIO	4.3	0.0															
103 MENT ARV	4.3	0.0	.5														
104 OPUN FRA	4.3	0.0							.1								
105 ORTH LUT	4.3	0.0															
106 PENS GRA	4.3	0.0															
107 PENS PRO	4.3	0.0															
108 PENS SP.	4.3	0.0															.1
PICE GLA	4.3	0.0															
109 PLAN MAJ	4.3	0.0	.5														
110 POTE ARU	4.3	0.0															
111 POTE HIP	4.3	0.0															.5
112 POTE PEN	4.3	0.0															
113 RIBE TRI	4.3	0.0				.5											
114 RORI PAL	4.3	0.0	.5														
115 RUBU ARC	4.3	0.0															
116 RUME OCC	4.3	0.0		.5													
117 RUME TRI	4.3	0.0	.5														

LEVEL	ZONE	ASSC	TYPE
ECOSYM UNIT	PRPARK		1

TRIAL GROUP #1/1

PRESENCE (%P), MEAN COVER (MC), PERCENT COVER (%C)

PUBLIC LANDS
EDMONTON, ALBERTA
13:46:32 AUG 21, 1985
TABLE 1 PAGE 4

PLOT NUMBER	AVERAGE VALUE		JR84 010	JR84 011	JR84 012	JR84 013	JR84 014	JR84 015	JR84 016	JR84 017	JR84 018	JR84 019	JR84 020	JR84 021	JR84 022	JR84 023	JR84 024
NUMBER OF SPECIES PER PLOT	18.0		19	6	29	31	18	19	15	12	16	16	14	16	25	7	18
SPECIES	%P	MC	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C	%C
118 SCIR MIC	4.3	0.0	.5														
119 SCIR VAL	4.3	0.0		01													
SHEP CAN	4.3	0.0															
120 SMIL TRI	4.3	0.0				.1									01		
121 SOLI GIG	4.3	0.0															.5
122 SOLI SPA	4.3	0.0															
123 STAC PAL	4.3	0.0	.5														
124 STIP COL	4.3	0.0															.5
EX LAYER																	
125 PELT CAN	17.4	0.1				.5									.1		
126 USNE SP.	13.0	0.1															
127 PLEU SCH	8.7	0.1															
128 CLAD GRA	8.7	0.0													.5		
129 EURH PUL	8.7	0.0															
130 PTIL CRI	8.7	0.0															
131 CLAD CHL	4.3	0.0															
132 CLAD RAN	4.3	0.0															
133 DREP UNC	4.3	0.0															
134 HYLO SPL	4.3	0.0															

LEVEL	ZONE	ASSC	TYPE
ECOSYM UNIT	PRPARK		1

TRIAL GROUP #1/1

PRESENCE (%P), MEAN COVER (MC), PERCENT COVER (%C)

PUBLIC LANDS
EDMONTON, ALBERTA
13:46:32 AUG 21, 1985
TABLE 1 PAGE 5

PLOT NUMBER	JR84 025	JR84 026	JR84 027	JR84 028	JR84 029	JR84 055	JR84 056	JR84 057
NUMBER OF SPECIES PER PLOT	19	19	5	15	11	32	26	25
SPECIES	%C	%C	%C	%C	%C	%C	%C	%C
A1 LAYER								
1 PICE GLA			20			01		60
2 POPU TRE		70						
3 BETU NEO								
4 POPU BAL								
A2 LAYER								
PICE GLA			60					25
POPU TRE						10		.5
POPU BAL								
BETU NEO								
B1 LAYER								
POPU TRE		01				15		
5 AMEL ALN		05						
6 CORN STO								
7 PRUN VIR								
8 SALI BEB								
PICE GLA								
9 SALI PLA								01
10 SALI SP.								
B2 LAYER								
AMEL ALN	20	02				10	.5	
11 ROSA ACI	30	02				03		02
12 ROSA WOO		60					.5	
CORN STO								
PRUN VIR								
13 SHEP CAN						.5		.5
14 VIBU EDU								
PICE GLA								
15 RUBU IDA								
16 SALI EXI								
POPU TRE						02		
BETU NEO								
17 ELAE COM								
POPU BAL								
18 SYMP OCC	01							
C LAYER								
19 VICI AME	01	.5		.5	.5	.5	.5	
20 GALI BOR	05	01				01	10	.5
ROSA ACI	05	01			.5	01		02
21 SYMP ALB		02				.5		.1
22 STIP CUR	01			02	60		01	
23 ARTE FRI				.5	.5			
24 ACHI MIL	01	.5		.5		.5		
25 CAMP ROT	.5			.5		01	01	
26 LINU LEW				.5		.5	.5	
27 FRAG VIR		02				05		
28 KOEL MAC	.5							
29 ALLI CER							.1	

LEVEL	ZONE	ASSC	TYPE
ECOSYM UNIT	PRPARK		1

TRIAL GROUP #1/1

PRESENCE (%P), MEAN COVER (MC), PERCENT COVER (%C)

PUBLIC LANDS
EDMONTON, ALBERTA
13:46:32 AUG 21, 1985
TABLE 1 PAGE 6

PLOT NUMBER	JR84 025	JR84 026	JR84 027	JR84 028	JR84 029	JR84 055	JR84 056	JR84 057
NUMBER OF SPECIES PER PLOT	19	19	5	15	11	32	26	25
SPECIES	%C	%C	%C	%C	%C	%C	%C	%C
30 MAIA CAN								
31 SOLI MIS		01						
SYMP OCC						01		01
32 GRAS SP.	40				.5		.5	
ROSA WOO				05				
33 LATH OCH		10				15		.5
34 MONA FIS	.5						01	
35 SMIL STE	02					02	.5	.1
36 AGRO TRA		.5				.5	01	
37 ARAL NUD	05					.5		
38 ERIG GLA				05				
39 GEUM TRI								.5
40 RIBE OXY					.5		.5	
VIBU EDU		.5					.5	
41 POA PRA								
42 STIP VIR	20			60				
43 EQUI ARV				02	.5			
44 AGRO DAS								
45 STIP SP.								
46 POA SP.								
47 AGRO TVU						.5		
48 ARAB HIR								
49 LINN BOR							05	
50 ERIG CAE			01					
51 SPHA COC								02
52 TARA OFF					.5			
53 TRAG DUB		.5		.5				
54 ARCT UVA								
55 AGRP SP.								
56 STIP COM						50	40	
AMEL ALN								
57 BROM INE								
58 ANDR SEP	01						15	
59 BROM CIL								
60 AGRO SCA		10					.5	
61 ASTE SP.	.5			02				
62 ASTR ABO								
63 CALA CAN								
64 MELI ALB								
65 ASTE CON								
66 HEUC RIC								
67 OXYT SPL						.5		
POPU TRE							.5	
68 PYRO ASA							.5	
69 RANU SP.								.1
RUBU IDA								
70 THAL VEN								
71 CARE AQU		.5						

University of Alberta

LEVEL	ZONE	ASSC	TYPE
ECOSYM UNIT	PRPARK		1

TRIAL GROUP #1/1

PRESENCE (%P), MEAN COVER (MC), PERCENT COVER (%C)

PUBLIC LANDS
EDMONTON, ALBERTA
13:46:32 AUG 21, 1985
TABLE 1 PAGE 7

PLOT NUMBER	JR84 025	JR84 026	JR84 027	JR84 028	JR84 029	JR84 055	JR84 056	JR84 057
NUMBER OF SPECIES PER PLOT	19	19	5	15	11	32	26	25
SPECIES	%C	%C	%C	%C	%C	%C	%C	%C
72 BROM SP.					10			
73 CICU MAC								
74 ARTE LUD				05				
75 ELYM INN								
76 JUNC BAL								
PRUN VIR								
77 APOC AND						02		
78 OXYT SP.								
79 ACHI SIB								
80 ACTA RUB								
81 AGRO REP								
82 ALNU TEN								
83 ANEM CYL	.5							
84 ANEM MUL							.5	
85 APOC CAN								
86 ARTE CAM							.5	
87 ASTE CIL								
88 ASTE LAE						.5		
89 ASTR STR								
90 BECK SYZ								
91 BROM AND								
92 CALA INE								
93 CHEN LEP					.5			
94 CORN CAN								
95 DANT CAL						.5		
96 DISP TRA								
97 EPIL SP.								
98 EQUI PRA								
99 GALI TRI								
100 GUTI SAR					.5			
101 HORD JUB								
102 LONI DIO						.5		
103 MENT ARV								
104 OPUN FRA								
105 ORTH LUT							.5	
106 PENS GRA							.5	
107 PENS PRO				.5				
108 PENS SP.								
PICE GLA								.1
109 PLAN MAJ								
110 POTE ARU							.5	
111 POTE HIP								
112 POTE PEN				.5				
113 RIBE TRI								
114 RORI PAL								
115 RUBU ARC								01
116 RUME OCC								
117 RUME TRI								

LEVEL	ZONE	ASSC	TYPE
ECOSYM UNIT	PRPARK		1

TRIAL GROUP #1/1

PRESENCE (%P), MEAN COVER (MC), PERCENT COVER (%C)

PLOT NUMBER	JR84 025	JR84 026	JR84 027	JR84 028	JR84 029	JR84 055	JR84 056	JR84 057
NUMBER OF SPECIES PER PLOT	19	19	5	15	11	32	26	25
SPECIES	%C	%C	%C	%C	%C	%C	%C	%C
118 SCIR MIC								
119 SCIR VAL								
SHEP CAN								
120 SMIL TRI								
121 SOLI GIG								
122 SOLI SPA	.5							
123 STAC PAL								
124 STIP COL								
EX LAYER								
125 PELT CAN			O1				.1	.5
126 USNE SP.			.1					O1
127 PLEU SCH						.5		O1
128 CLAD GRA						.5		.1
129 EURH PUL								.5
130 PTIL CRI						.5		.5
131 CLAD CHL						.1		
132 CLAD RAN						.5		.5
133 DREP UNC								.5
134 HYLO SPL								

University of Alberta

LIST OF REFERENCES

Adams, B. 1981. Range Ecology and the Impact of Livestock Grazing on the Peace River Slopes, Alberta. Grazing Land Management, Public Lands Division, Alberta Energy and Natural Resources. Edmonton.

Alberta. Energy and Natural Resources, Fish and Wildlife Division. 1984. "Aerial Surveys of Ungulates along Sections of the Peace and Smoky Rivers, Jan. 16 and 18, 1984." Edmonton.

_____. 1981. "Aerial Ungulate Survey of the Peace River: B.C. Border to Peace River Town, WMU M526, F359, M521. Jan 23, 24, 1981." Edmonton.

_____. 1979. "Aerial Ungulate Survey of the Peace River from Townsite to B.C. Border, Jan. 3, 1979." Edmonton.

Alberta. Energy and Natural Resources, Public Lands Division. 1959. "Land Appraisal Report 80-4-W6." Edmonton.

Camsell, C. and W. Malcolm. 1921. The Mackenzie River Basin. Canada Department of Mines, Geological Survey Mem. 108. Ottawa.

Conrad, H.S. 1979. How to Know the Mosses and Liverworts (Second Edition) Dubuque, Iowa: Wm. C. Brown Co.

Cottonwood Consultants Ltd. 1983. A Biophysical Systems Overview for Ecological Reserves Planning in Alberta. Alberta Recreation and Parks. Edmonton.

Envirocon. 1976. Feasibility Study, Dunvegan Hydro-Power Site. Vol. II. Environmental Assessment. Alberta Environment, Planning Division. Edmonton.

Environment Canada. 1982. Canadian Climate Normals 1951-1980. Ottawa.

Jones, J.F. 1966. Geology and Groundwater Resources of the Peace River District, Northwestern Alberta. Alberta Research Council Bulletin 16. Edmonton.

Hale, M.E. 1969. How to Know the Lichens. (2nd. ed.). Wm. C. Brown Co. Dubuque, Iowa.

Lee, P. 1981. "Peace River Parklands Biogeographic Zone." Alberta Energy and Natural Resources, Public Lands Division. Edmonton. Internal report.

Lee, P. and D. MacIsaac. 1981. "Systems Evaluation in Silver Valley Checksheet." Public Lands Division, Alberta Energy and Natural Resources. Edmonton. Internal report.

Lorberg, E. and N. de la Cruz. 1981. Groundwater Resources Peace River Basin and Northern Alberta. Alberta Environment, EPS Earth Sciences Division. Edmonton.

Masterton, J.M., R.B. Crowe and W.M. Baker. 1976. The Tourism and Outdoor Recreation Climate of the Prairie Provinces. Environment Canada. Ottawa.

Mollard, J.D. 1975. Report on Terrain Conditions along the Peace River Valley Sides Related to Potential Reservoir Bank Stability - Ft. St. John, British Columbia to the Town of Peace River, Alberta. Montreal Engineering. Calgary.

Monenco. 1976. Feasibility Study. Dunvegan Hydro Power Site Vol. VI Engineering Study. Alberta Environment, Planning Division. Edmonton.

Moss, E.H. 1983. Flora of Alberta (2nd ed.). University of Toronto Press. Toronto.

Moss, E.H. 1952. "Grassland of the Peace River Region, Western Canada." Canadian Journal of Botany 30: 98-124.

Odynsky, Wm. and J.D. Newton. 1950. Soil Survey of the Rycroft and Watino Sheets. Research Council of Alberta Report No. 56. Edmonton.

Packer, J.G. and C.E. Bradley. 1984. A Checklist of the Rare Vascular Plants of Alberta with Maps. Provincial Museum of Alberta Occasional Paper No. 5. Edmonton.

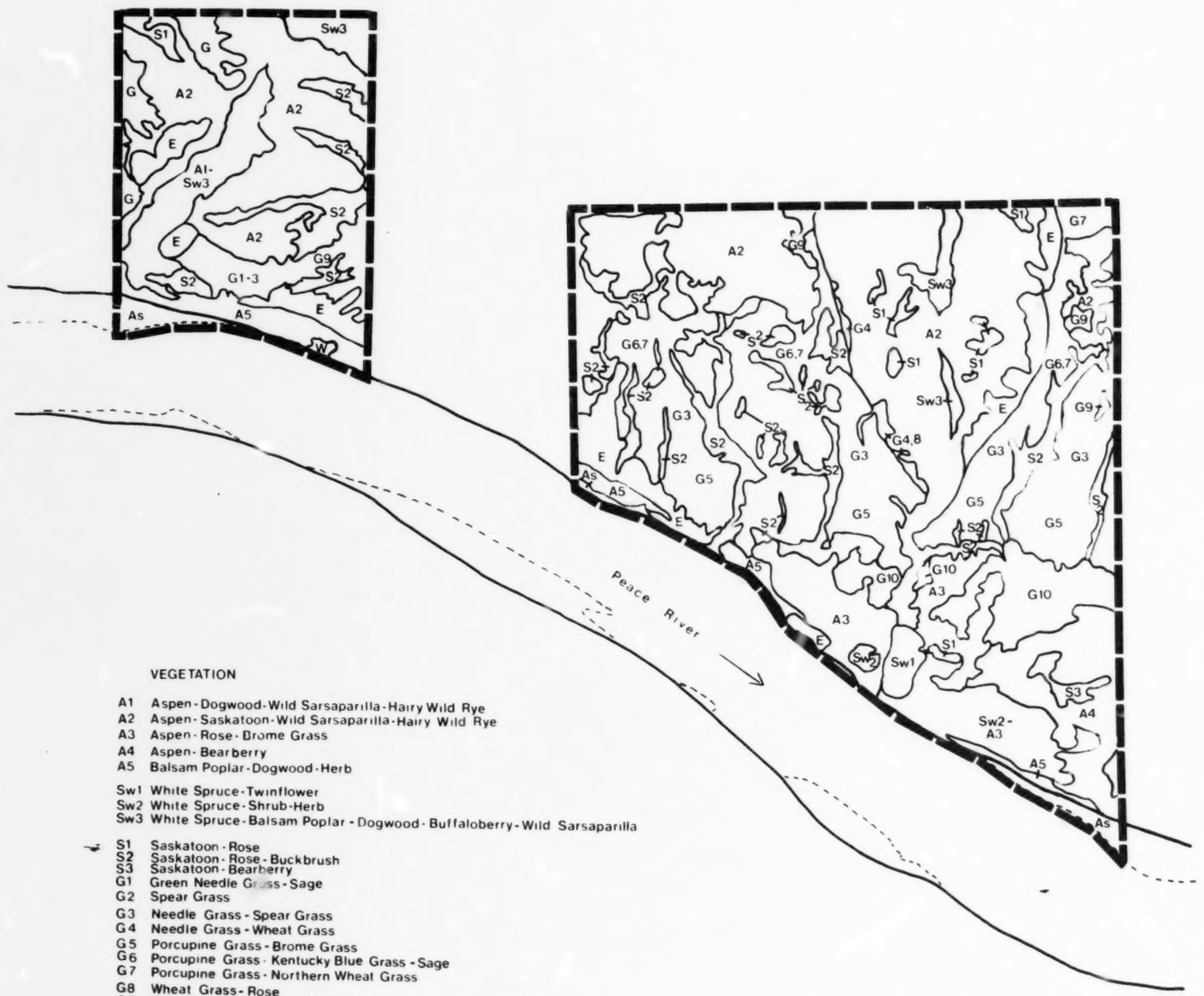
Salt, W.R. and J.R. Salt. 1976. The Birds of Alberta. Hurtig Publishers. Edmonton.

Taylor, R.S. 1960. "Some Pleistocene Lakes of NE Alberta and Adjacent Areas (revised)." Journal of Alberta Society of Petroleum Geologists 8(6): 167-178.

Wallis, C.A. 1982. "An overview of the Mixed Grasslands of North America" in Grassland Ecology and Classification Symposium Proceedings June 1982. B.C. Ministry of Forests. Victoria.

Wilkinson, K. 1981. "Remnant and Early Settlement Prairies and Solonetzic Soils in the Peace River District." M.Sc. thesis, University of Calgary. Calgary.

Zirul, D.L. 1970. "IBP Checksheet, Dunvegan and Erinlodge." International Biological Program (checksheet on Natural Area File No. 21, Natural Areas Program, Public Lands Division, Alberta Energy and Natural Resources. Edmonton.



VEGETATION

A1 Aspen - Dogwood - Wild Sarsaparilla - Hairy Wild Rye
A2 Aspen - Saskatoon - Wild Sarsaparilla - Hairy Wild Rye
A3 Aspen - Rose - Brome Grass
A4 Aspen - Bearberry
A5 Balsam Poplar - Dogwood - Herb

Sw1 White Spruce - Twinflower
Sw2 White Spruce - Shrub - Herb
Sw3 White Spruce - Balsam Poplar - Dogwood - Buffaloberry - Wild Sarsaparilla

S1 Saskatoon - Rose
S2 Saskatoon - Rose - Buckbrush
S3 Saskatoon - Bearberry
G1 Green Needle Grass - Sage
G2 Spear Grass
G3 Needle Grass - Spear Grass
G4 Needle Grass - Wheat Grass
G5 Porcupine Grass - Brome Grass
G6 Porcupine Grass - Kentucky Blue Grass - Sage
G7 Porcupine Grass - Northern Wheat Grass
G8 Wheat Grass - Rose
G9 Wheat Grass - Saskatoon - Rose
G10 Kentucky Blue Grass

W Sedge Wetland

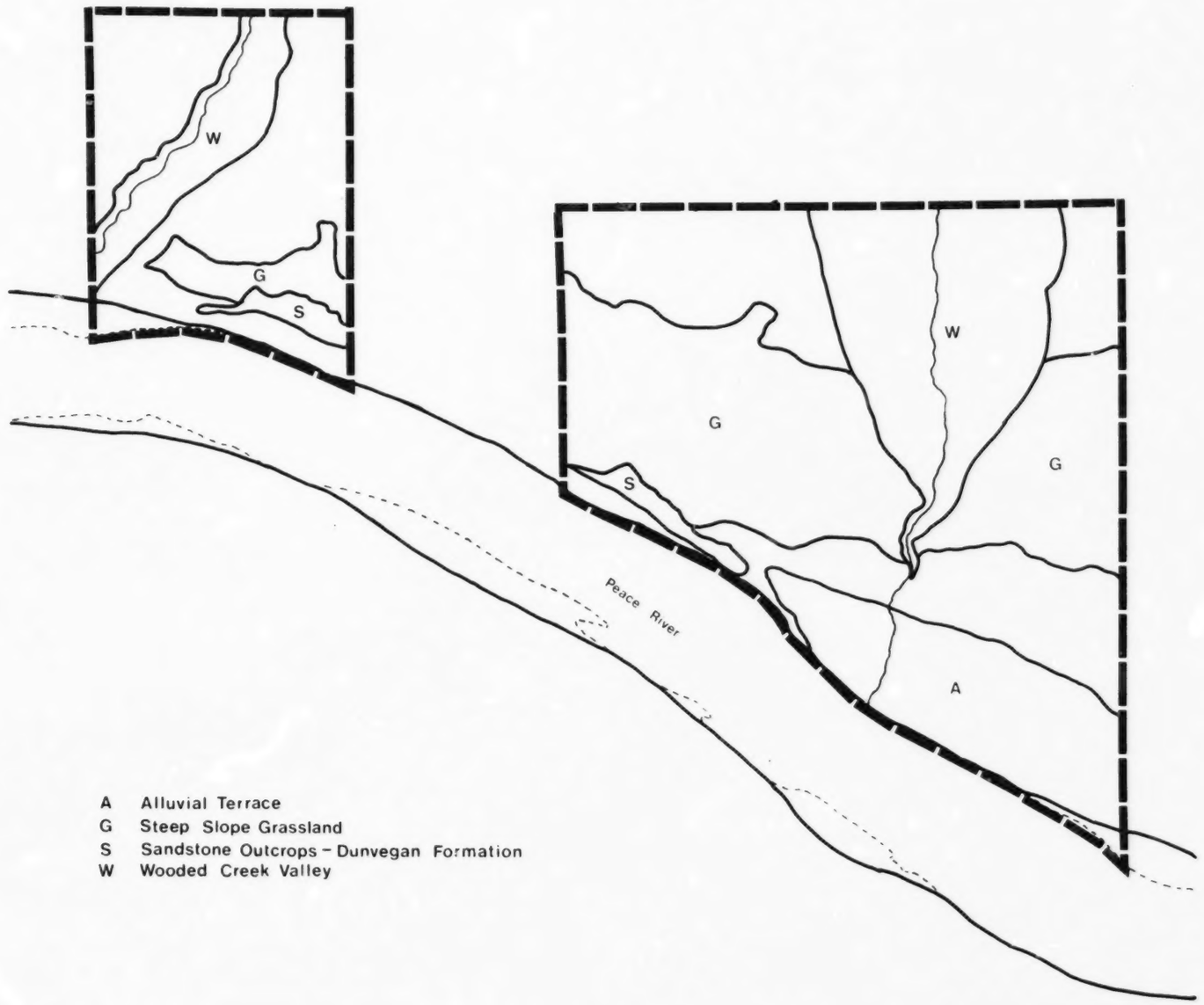
As Alluvial Shoreline

E Bedrock Exposure / Slump Scar

DUNVEGAN

VEGETATION

Scale 1:15000



A Alluvial Terrace
G Steep Slope Grassland
S Sandstone Outcrops – Dunvegan Formation
W Wooded Creek Valley

DUNVEGAN

SIGNIFICANT FEATURES

Scale: 1:15000